

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report	
RSY Pad: RSY 11 Use 1	Soil Origin: TU-099A ESU
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 01/21/2021

Systematic Soil Sample Data: RSY 11 Use 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	<sup>90</sup> Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-ESU-TU099A-001	1	Systematic	9,290	15,359	0.269	0.00248	0.0616
HPPG-ESU-TU099A-002	2	Systematic	9,207	15,359	0.588	-0.0542	N/A
HPPG-ESU-TU099A-003	3	Systematic	8,801	15,359	0.0203	0.0180	N/A
HPPG-ESU-TU099A-004	4	Systematic	9,992	15,359	0.472	0.0200	N/A
HPPG-ESU-TU099A-005	5	Systematic	9,020	15,359	0.314	-0.00182	N/A
HPPG-ESU-TU099A-006	6	Systematic	8,866	15,359	0.319	0.0765	N/A
HPPG-ESU-TU099A-007	7	Systematic	8,543	15,359	0.438	0.0160	N/A
HPPG-ESU-TU099A-008	8	Systematic	10,413	15,359	0.0427	-0.0442	N/A
HPPG-ESU-TU099A-009	9	Systematic	9,839	15,359	0.384	-0.0316	N/A
HPPG-ESU-TU099A-010	10	Systematic	8,643	15,359	0.339	-0.0464	N/A
HPPG-ESU-TU099A-011	11	Systematic	9,190	15,359	0.331	0.0126	0.199
HPPG-ESU-TU099A-012	12	Systematic	9,672	15,359	0.249	0.0243	N/A
HPPG-ESU-TU099A-013	13	Systematic	10,005	15,359	0.414	0.0270	N/A
HPPG-ESU-TU099A-014	14	Systematic	9,786	15,359	0.359	0.0246	N/A
HPPG-ESU-TU099A-015	15	Systematic	8,860	15,359	0.126	0.0198	N/A
HPPG-ESU-TU099A-016	16	Systematic	9,793	15,359	0.380	0.0114	N/A
HPPG-ESU-TU099A-017	17	Systematic	9,464	15,359	0.320	-0.0547	N/A
HPPG-ESU-TU099A-018	18	Systematic	9,980	15,359	0.465	0.0186	N/A
HPPG-ESU-TU099A-019	19	Systematic	9,754	15,359	0.463	0.0252	N/A
HPPG-ESU-TU099A-020	20	Systematic	10,212	15,359	0.292	0.0232	N/A
HPPG-ESU-TU099A-021	21	Systematic	9,573	15,359	0.350	-0.0429	-0.0198
HPPG-ESU-TU099A-022	22	Systematic	9,741	15,359	0.0422	0.0324	N/A
HPPG-ESU-TU099A-023	23	Systematic	9,818	15,359	0.332	-0.0448	N/A
HPPG-ESU-TU099A-024	24	Systematic	9,360	15,359	0.403	0.0145	N/A
HPPG-ESU-TU099A-025	25	Systematic	9,975	15,359	0.465	0.00108	N/A
<b>Soil Systematic Sample Statistics</b>					<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	<sup>90</sup> Sr Final Analytical Results (pCi/g)
Maximum					0.588	0.0765	0.199
Mean					0.327	0.0019	0.0803
Median					0.339	0.0145	0.0616
Minimum					0.0203	-0.0547	-0.0198
Standard Deviation					0.1424	0.0336	N/A

Biased Soil Sample Data: RSY 11 Use 1							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	<sup>226</sup> Ra Final Analytical Results (pCi/g)	<sup>137</sup> Cs Final Analytical Results (pCi/g)	<sup>90</sup> Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-ESU-TU099A-B-001	1	Biased	11,212	15,359	0.621	-0.0273	0.0492

CPM Counts per minute  
pCi/g Picocuries per gram

\* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-11052020-PG-ROV-279	11/05/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-11062020-PG-JSS-284	11/06/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-11062020-PG-JSS-282	11/06/2020	3x3	10/09/2021	271420
Biased Sample Survey	HPRS-11072020-PG-JSS-286	11/07/2020	3x3	10/09/2021	271420

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 11 Use 1
<p>1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 53 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>2) One-minute static follow-up measurements with the RS-700 were collected at 53 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-66. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 39-73). Ten percent of the systematic soil samples (three samples in total -001, -011, &amp; -021) were also analyzed for <sup>90</sup>Sr. Strontium-90 results are also included in the TestAmerica sample results report (pages 67-102). Samples HPPG-F-029 and HPPG-F-030 are field duplicates, correlating to systematic samples -001 and -007. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data.</p> <p>Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.</p>
<p>4) In accordance with Final Parcel G Work Plan Section 3.3.1 and 3.4.1, one biased sample was collected since all follow-up static measurements were below the ROC-specific critical levels. The biased sample was collected from the location of the highest gross gamma scan measurement. TestAmerica sample results are attached (pages 103-117). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.</p>
<p><b>Conclusions:</b></p> <p>In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.</p> <p>RSY 11 Use 1 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-099A ESU.</p> <p>APTIM requests RASO concurrence to release this soil as Non-LLRW.</p> <p>Disposition: This soil shall be used as backfill for TU-099.</p>

## Soil Scan Statistics

### Statistical Summary

Dataset	PG-RSY-11-U1				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	26.07	12.79	13.02	3.66
ROI-06	46.10	128.31	88.92	88.21	10.89
ROI-07	43.08	106.26	69.10	69.13	9.24
ROI-08	75.15	164.36	111.90	111.26	12.48
ROI-10	1,972.68	2,700.34	2,285.16	2,275.82	120.00

### Statistical Summary Reference Background

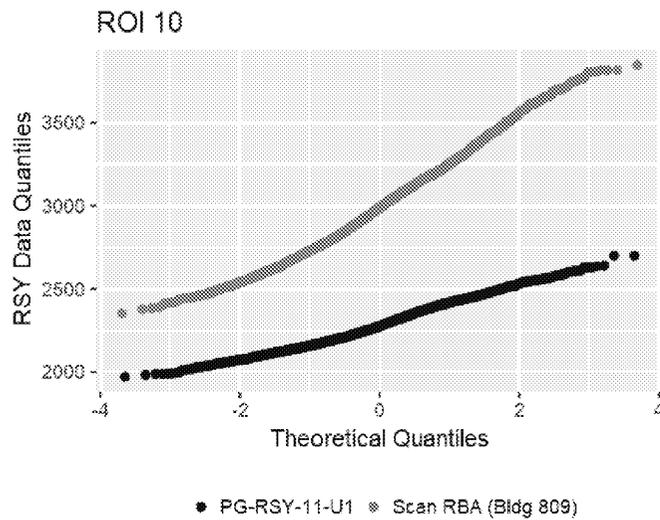
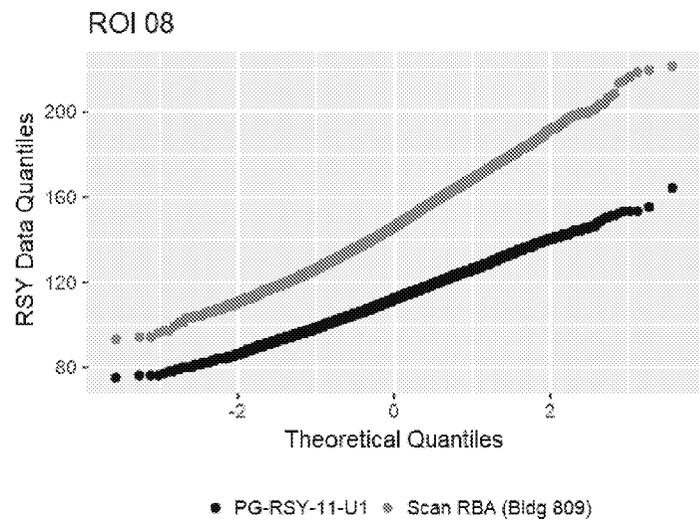
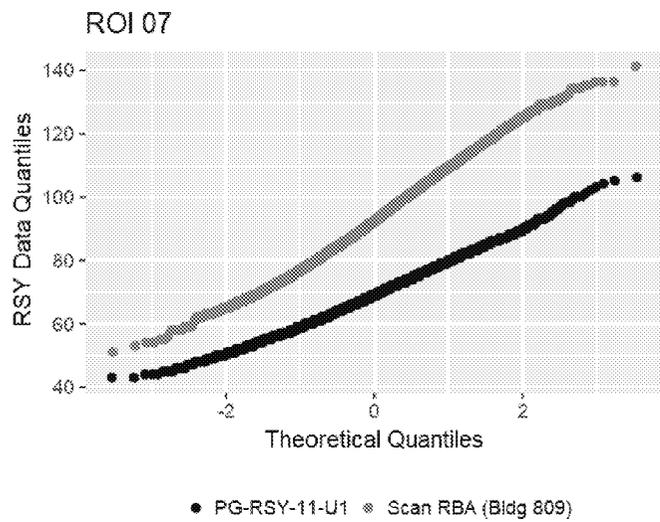
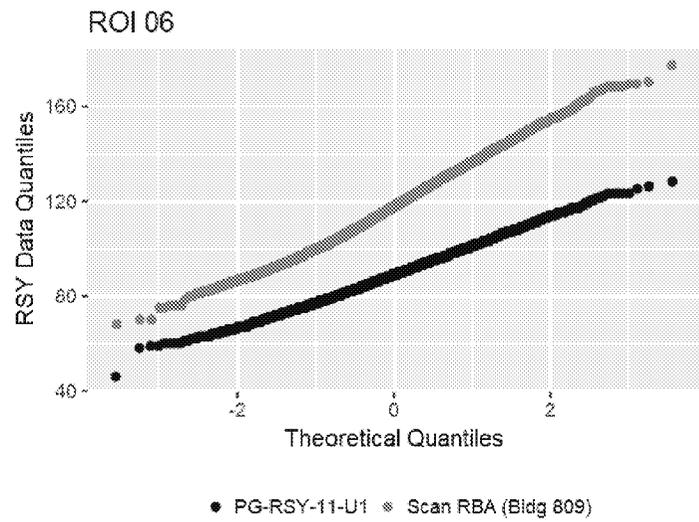
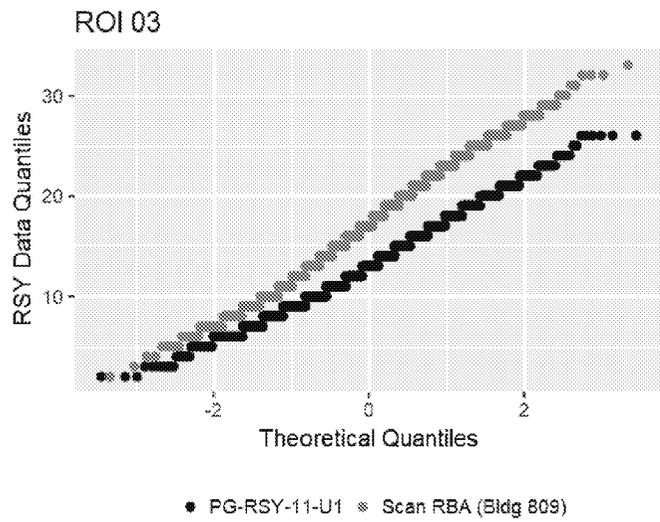
TYPE	Scan RBA (Bldg 809)				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	33.08	16.21	16.04	4.13
ROI-06	68.15	177.45	117.58	117.26	15.50
ROI-07	51.11	141.33	92.34	91.24	13.43
ROI-08	93.19	221.48	146.24	145.30	18.21
ROI-10	2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-11-U1	3876
Scan RBA (Bldg 809)	4632

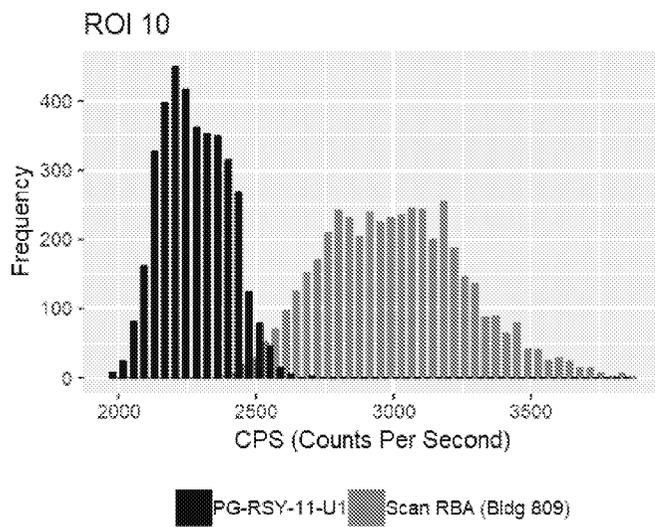
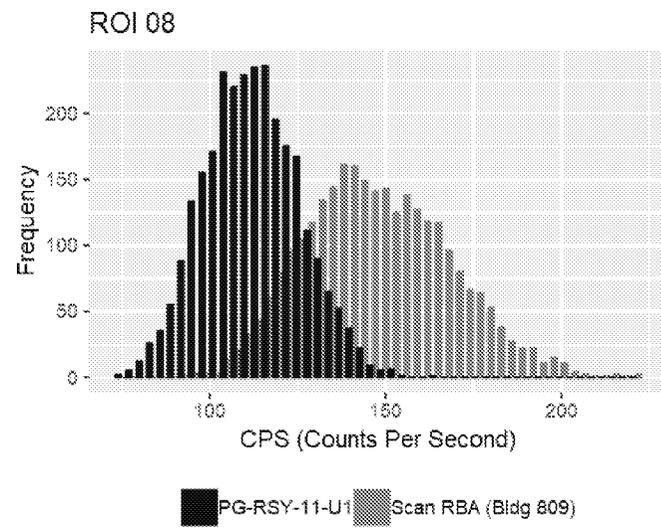
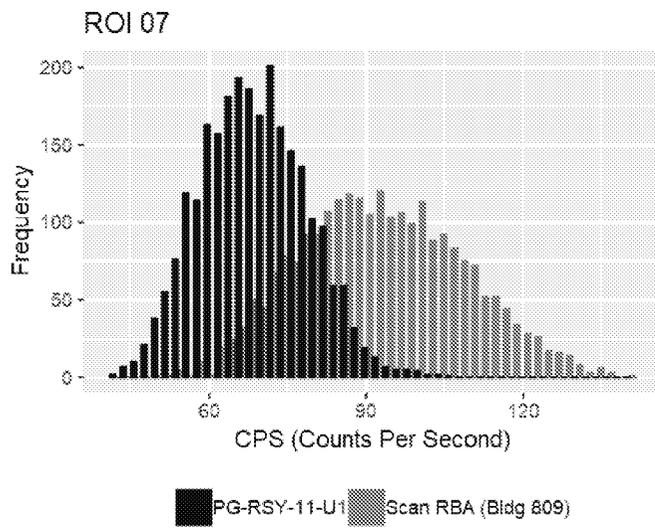
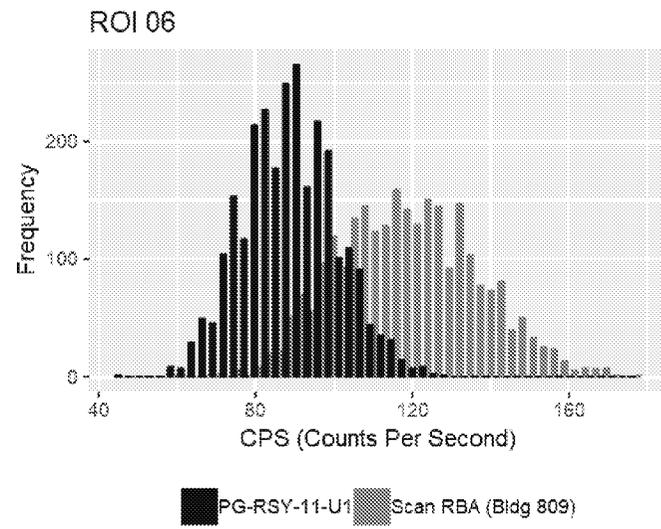
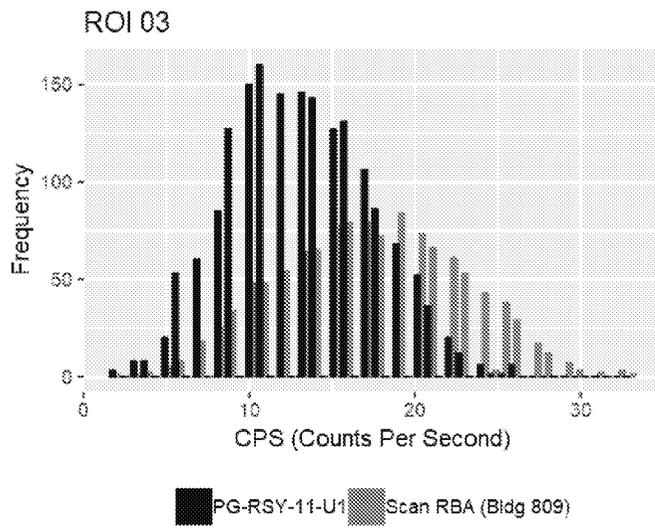
# Soil Scan Statistics

## Normal Q-Q Plots



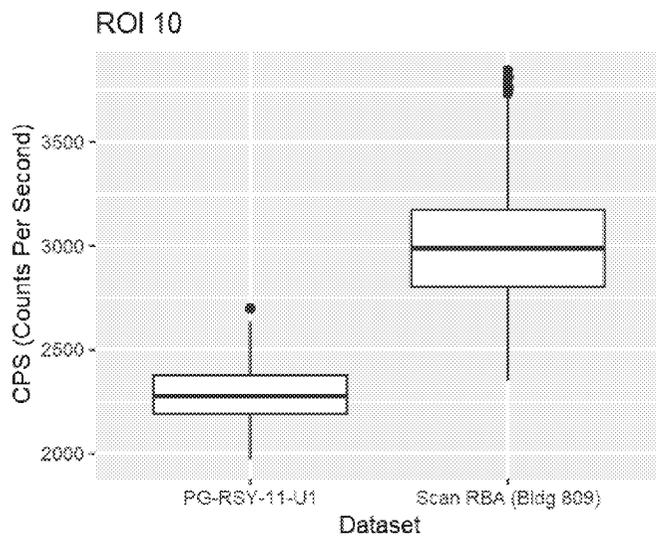
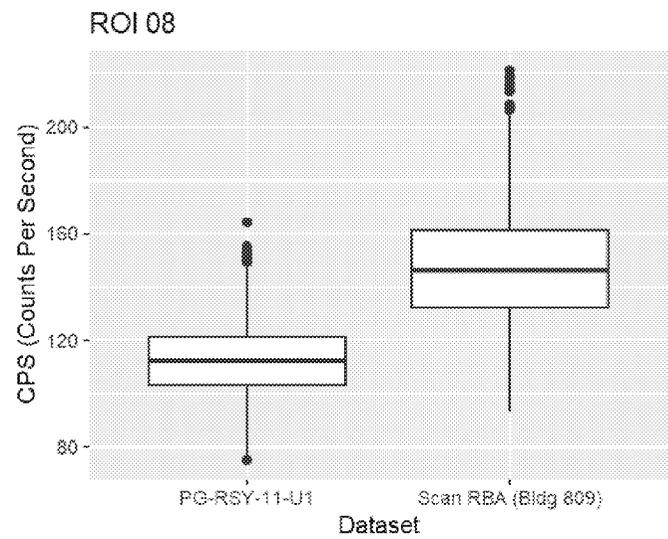
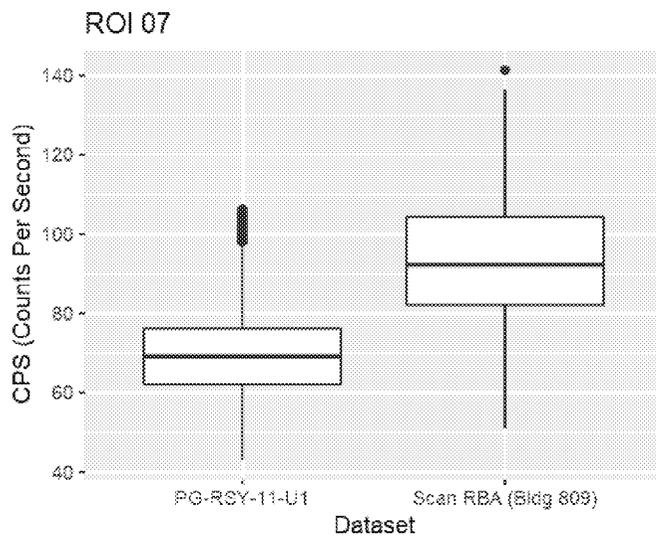
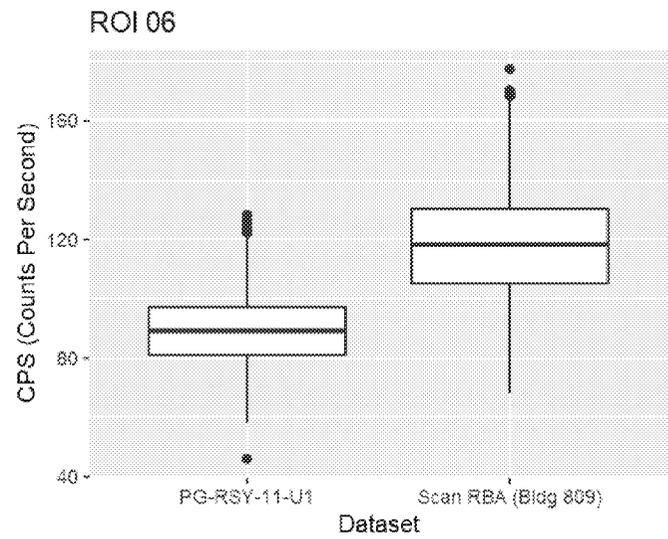
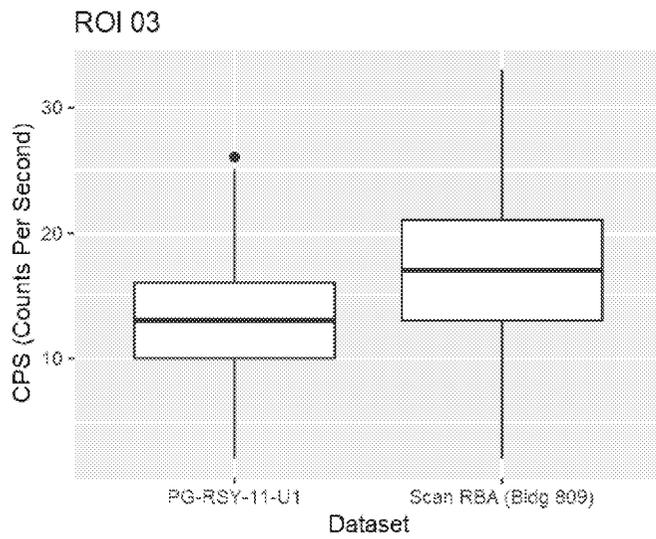
# Soil Scan Statistics

## Histograms



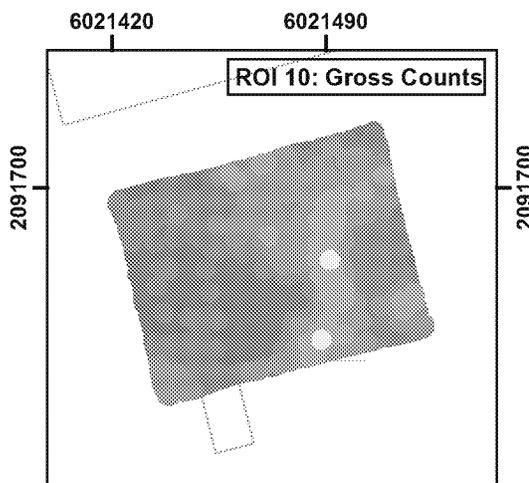
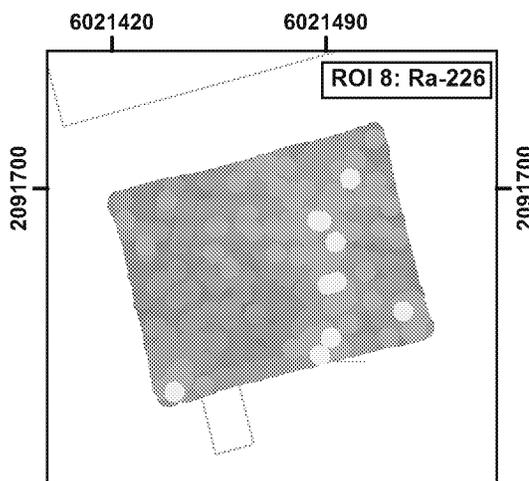
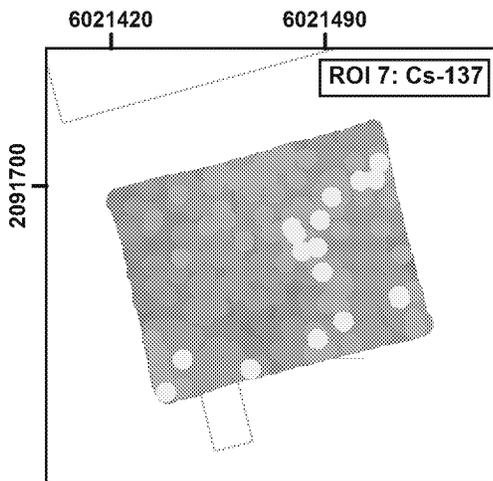
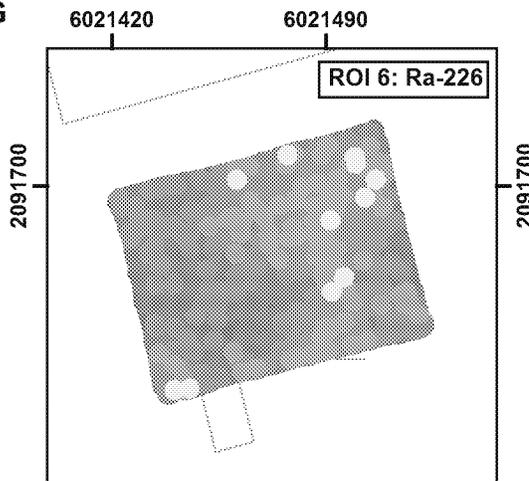
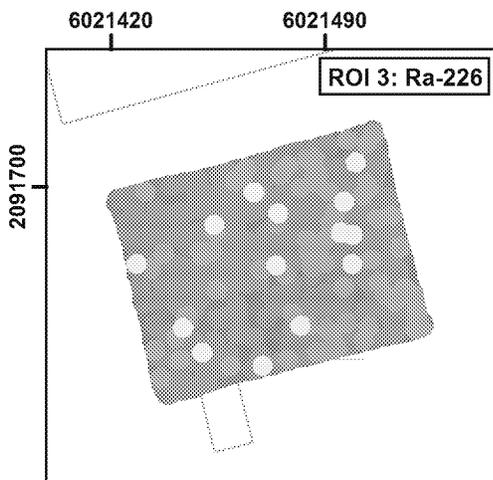
# Soil Scan Statistics

## Box Plots



**RSI Data Plots  
HPNS Parcel G  
RSY 11 Use 1**

TU-099A ESU



**RS 700 Gamma Walkover Survey Data (VD1)**

● > 3 std dev	● > -1 to < 0 std dev
● > 2 to < 3 std dev	● > -2 to < -1 std dev
● > 1 to < 2 std dev	● > -3 to < -2 std dev
● > 0 to < 1 std dev	● < -3 std dev

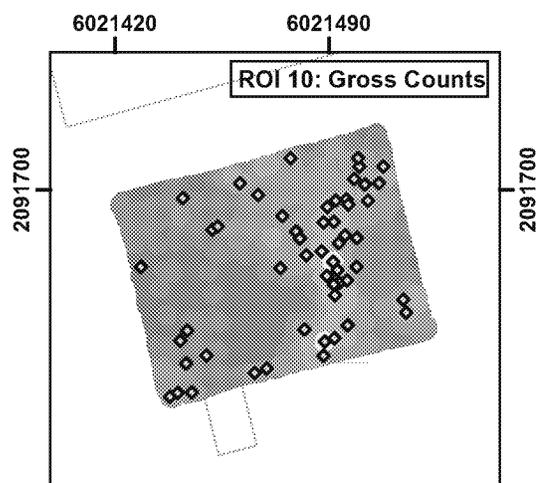
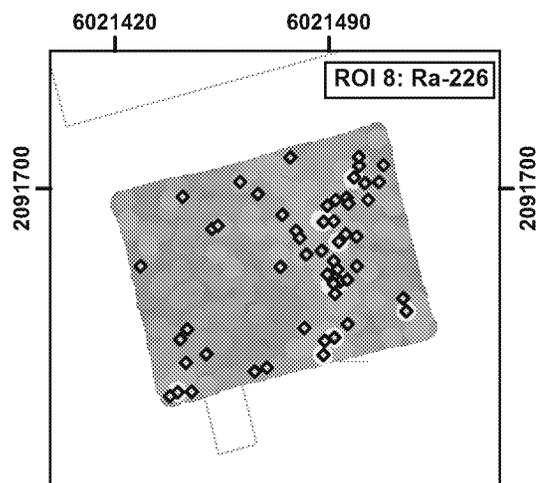
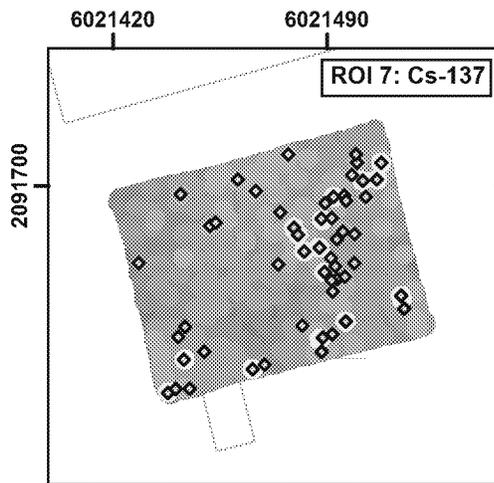
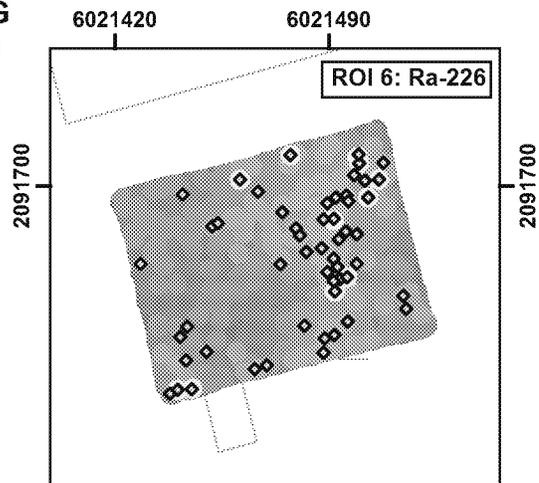
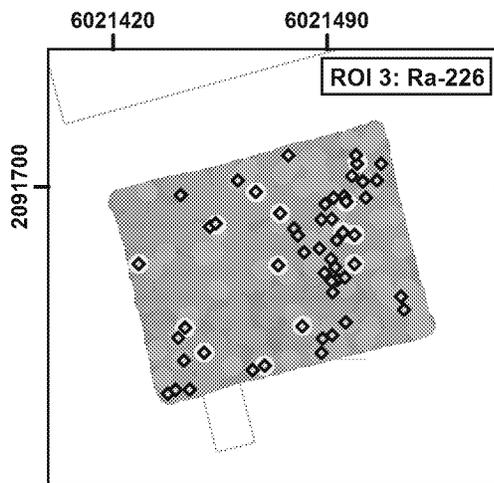
0 25 50 100 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

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**RSI Data Plots  
HPNS Parcel G  
RSY 11 Use 1**

TU-099A ESU



**RS 700 Gamma Walkover Survey Data (VD1)**

◆ Follow-Up Locations	● > -1 to < 0 std dev
● > 3 std dev	● > -2 to < -1 std dev
● > 2 to < 3 std dev	● > -3 to < -2 std dev
● > 1 to < 2 std dev	● < -3 std dev
● > 0 to < 1 std dev	

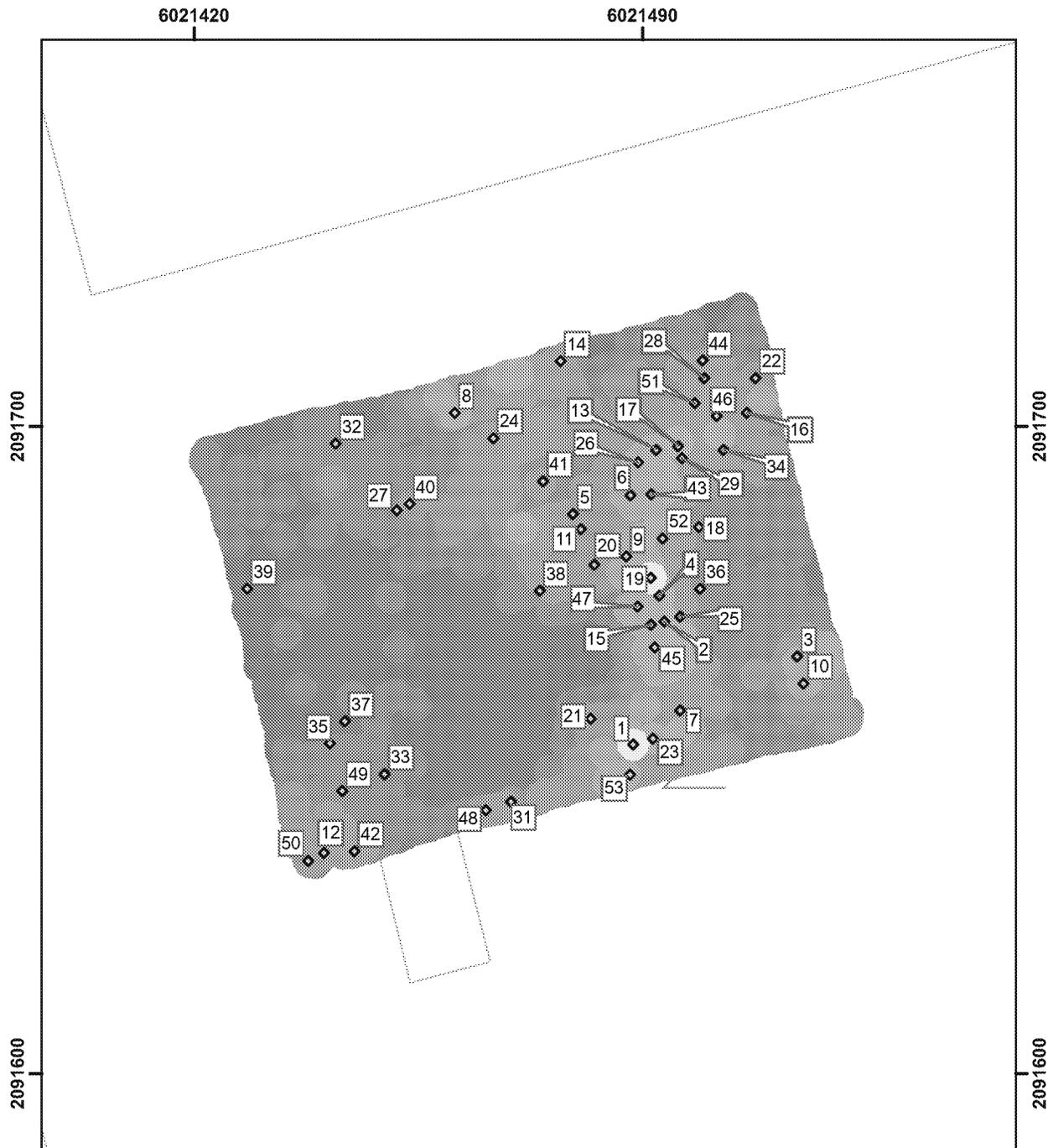
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### Follow-Up Static Survey HPNS Parcel G RSY 11 Use 1

TU-099A ESU



**RSY 11 Use 1 (VD1, ROI 10 Gross Gamma)**

◆ Follow-Up Locations	● > 1 to < 2 std dev	● > -2 to < -1 std dev
● > 3 std dev	● > 0 to < 1 std dev	● > -3 to < -2 std dev
● > 2 to < 3 std dev	● > -1 to < 0 std dev	● < -3 std dev

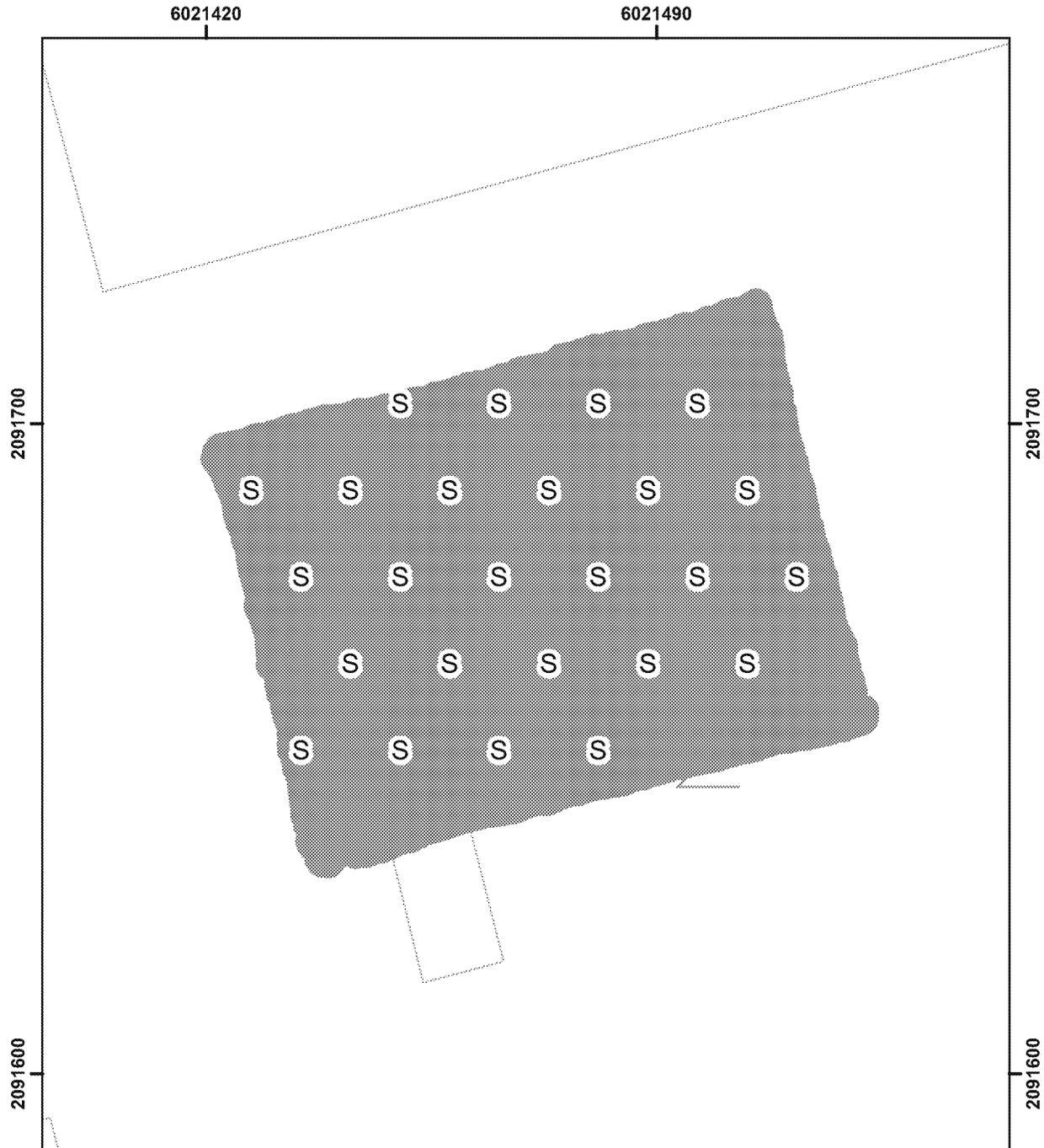
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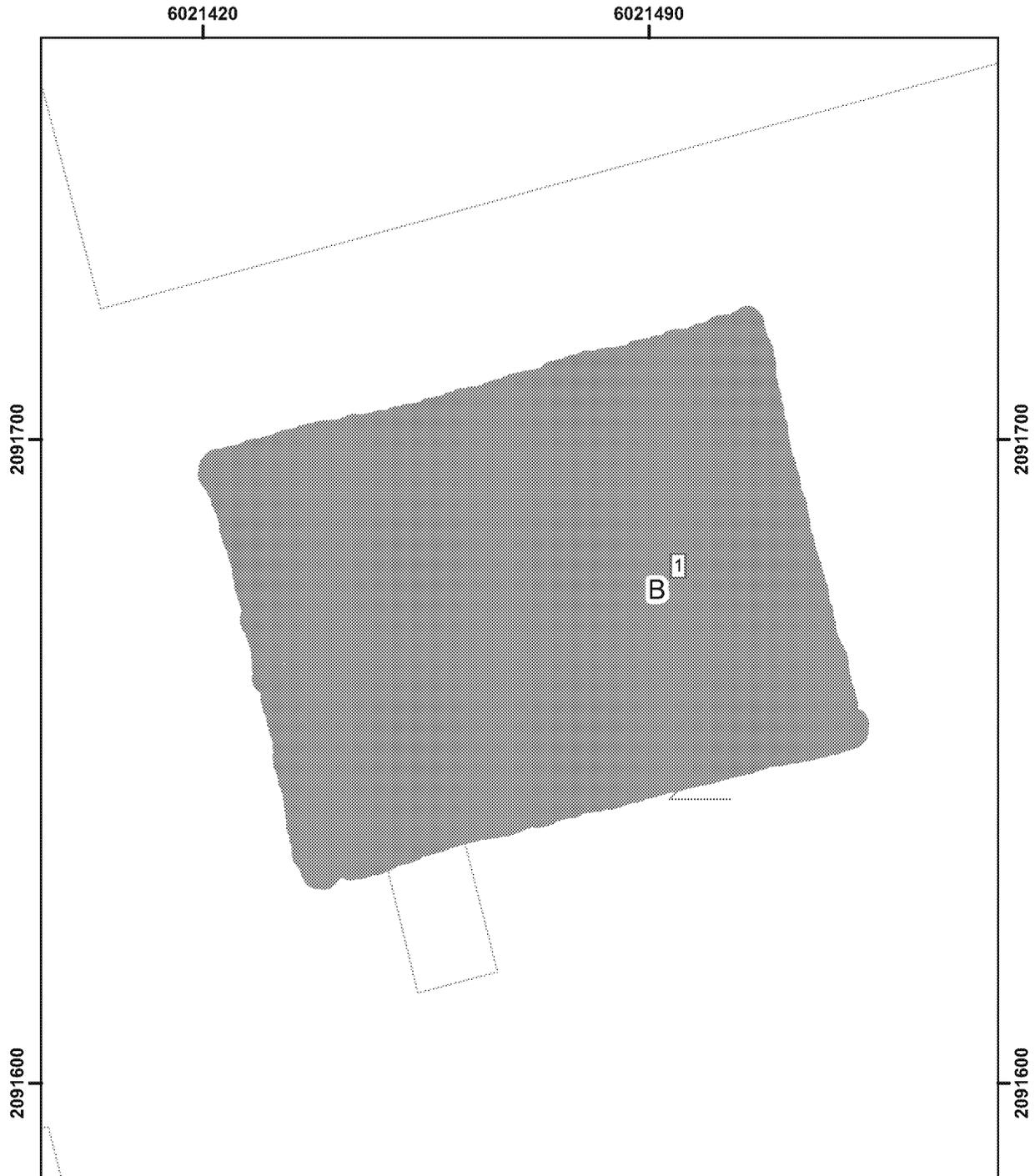


<p><b>RSY 11 Use 1</b></p> <ul style="list-style-type: none"><li>S Systematic Sample Locations</li><li>● RS-700 GWS Coverage</li></ul>	<p>0 10 20 40 Feet</p> <p>Coordinate system: CSP Zone III, NAD83, US Survey Foot</p> 
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### Biased Sampling HPNS Parcel G RSY 11 Use 1

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#### RSY 11 Use 1

- B Biased Sample Location
- RS-700 GWS Coverage

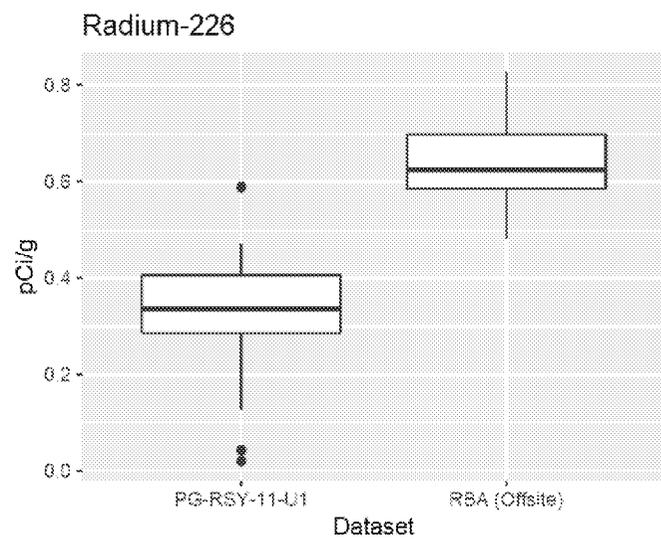
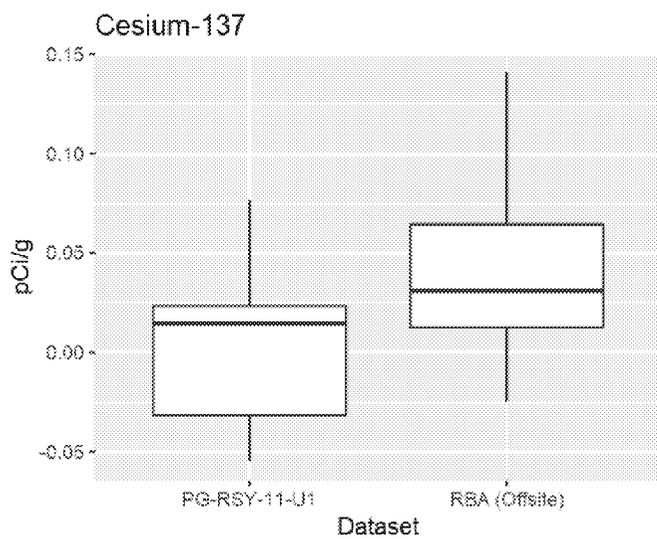
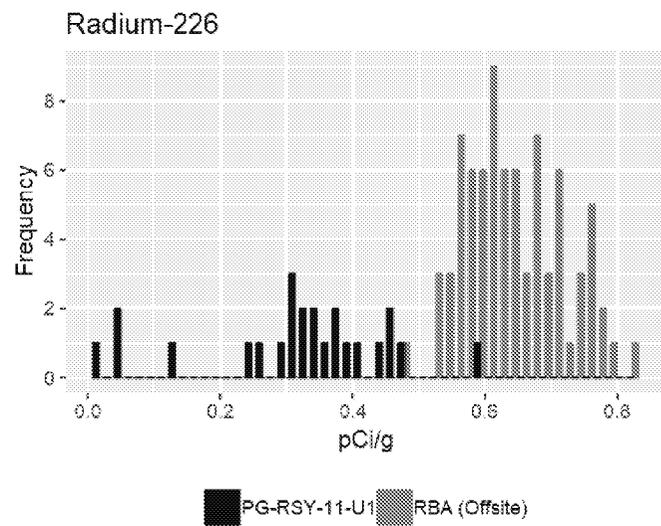
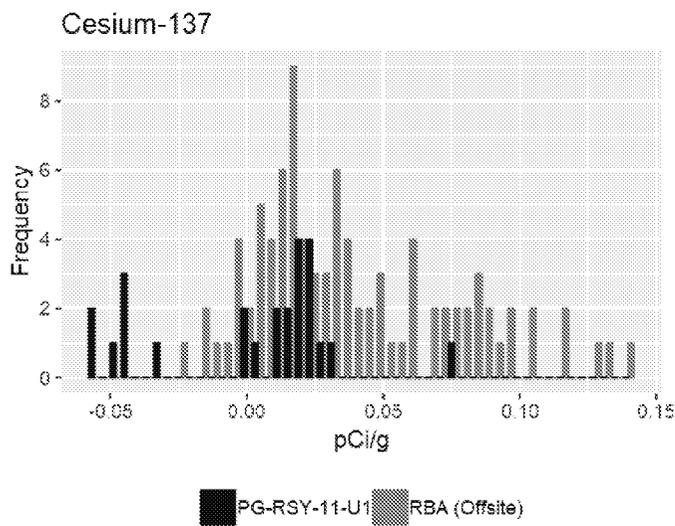
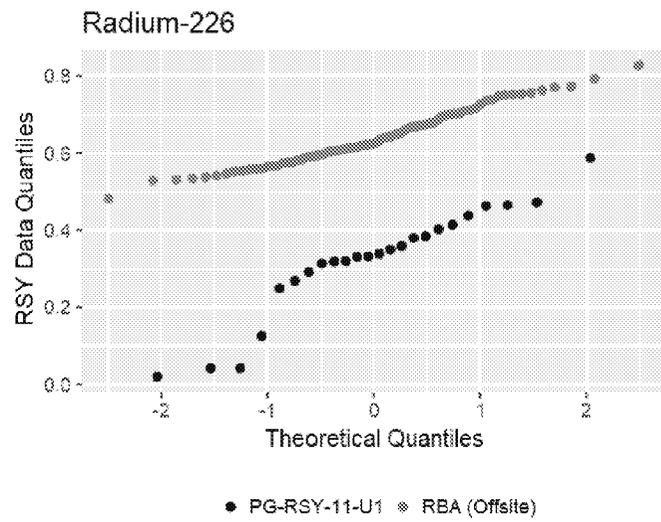
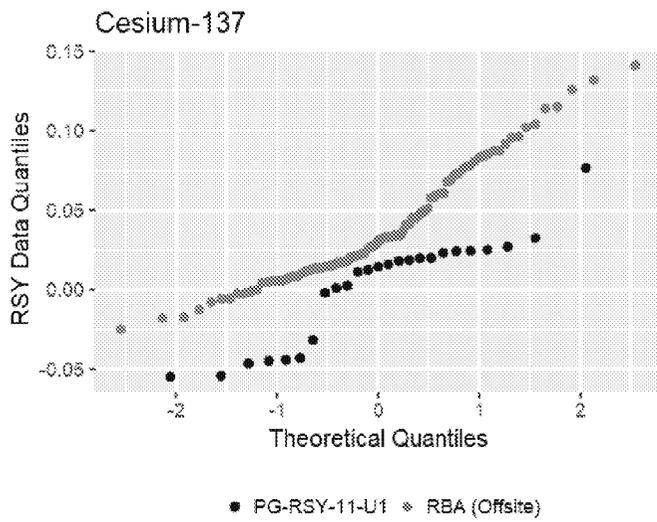
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Coordinate system: CSP Zone III, NAD83, US Survey Foot

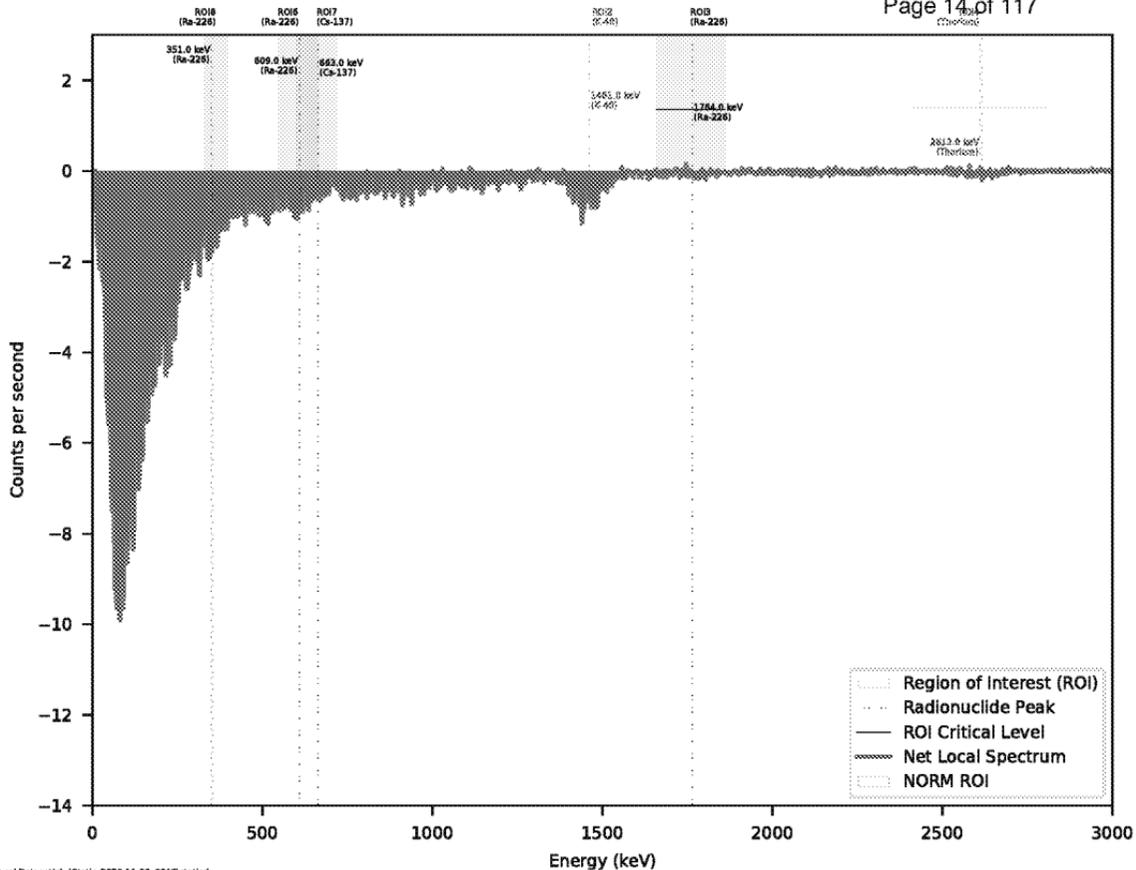


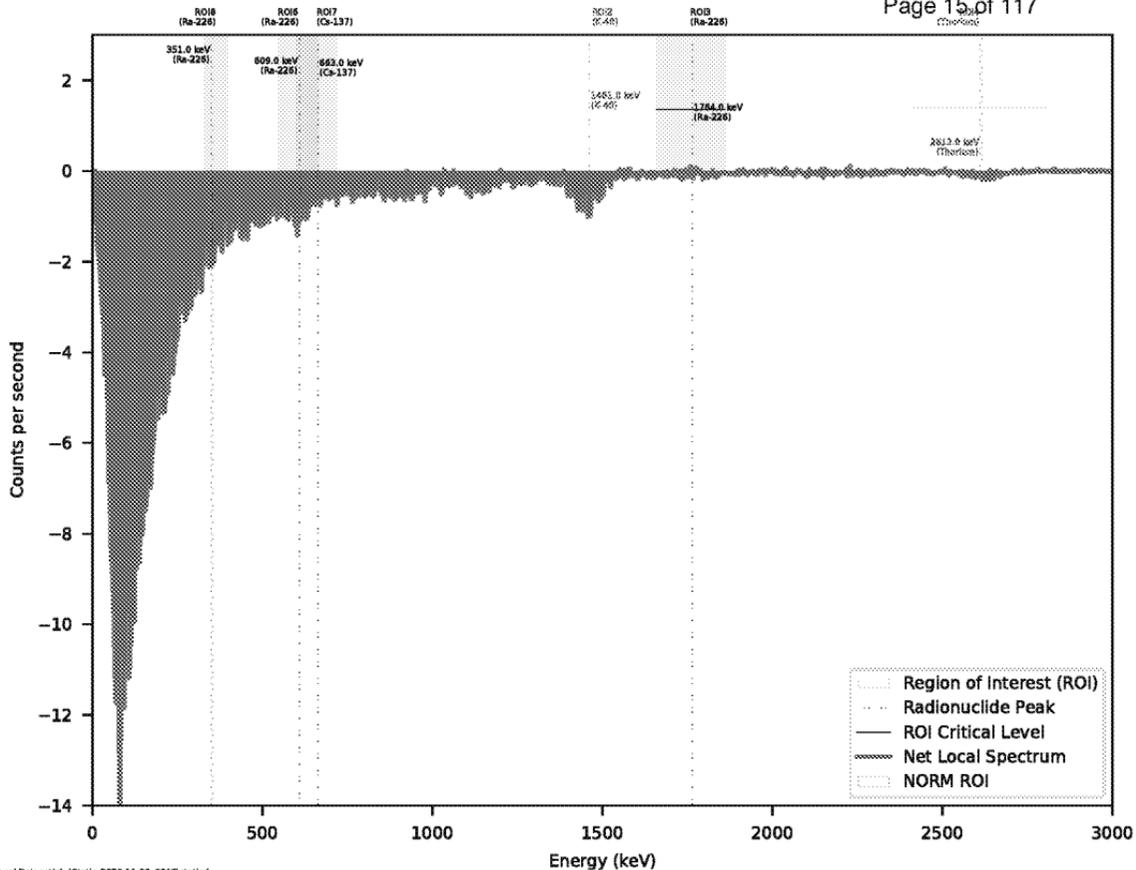
APTIM

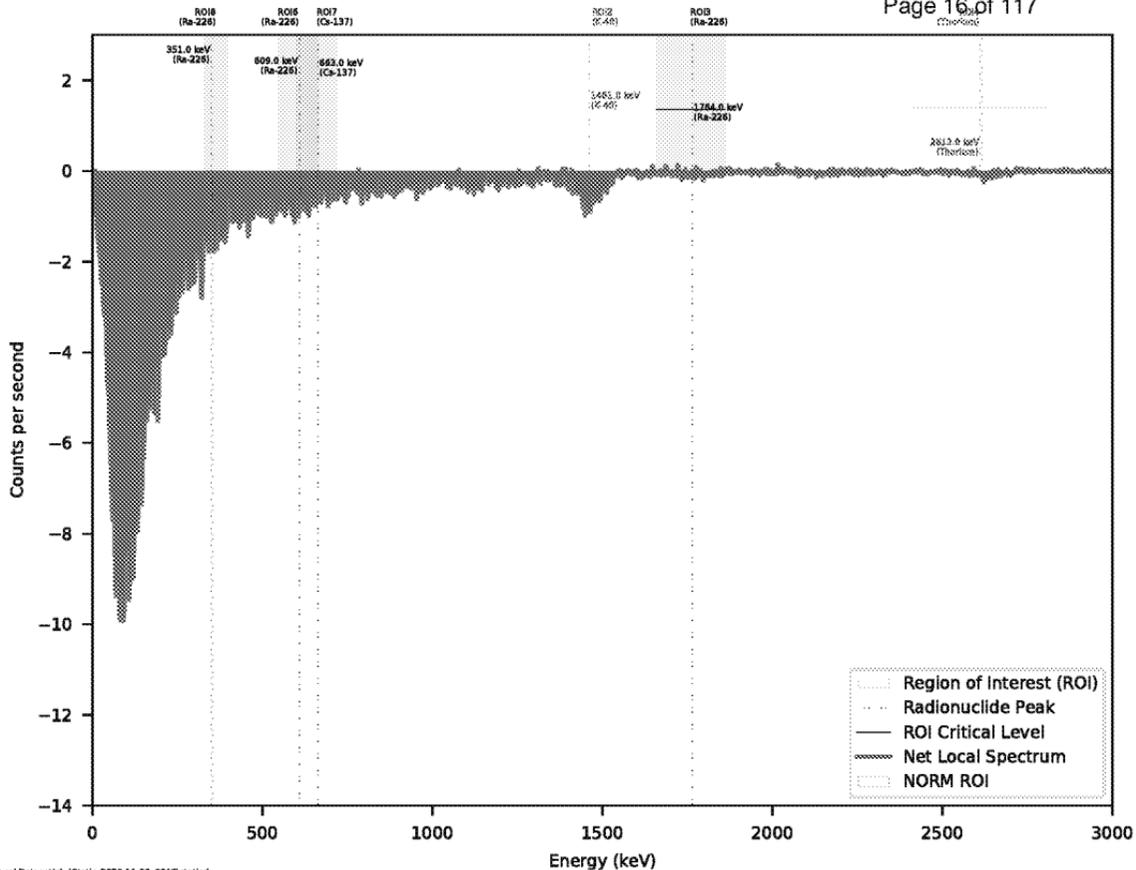
# Soil Sample Statistics

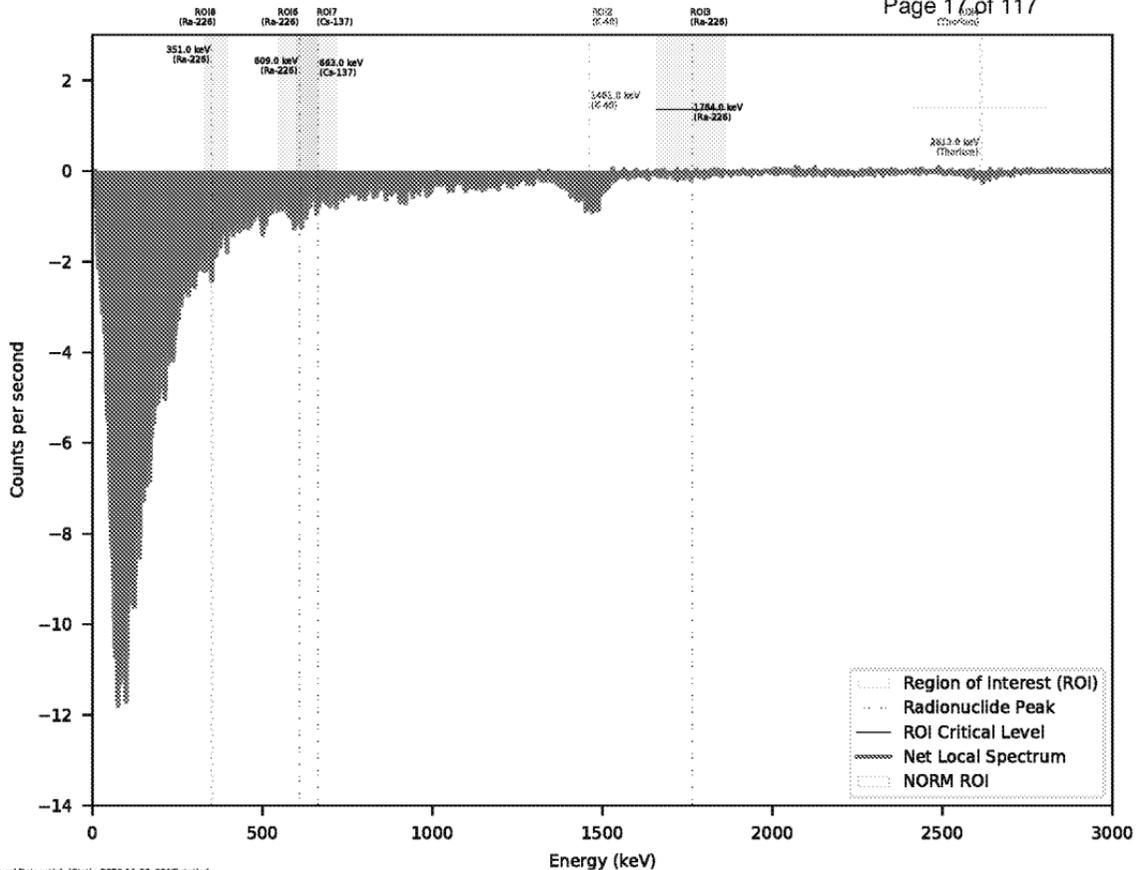


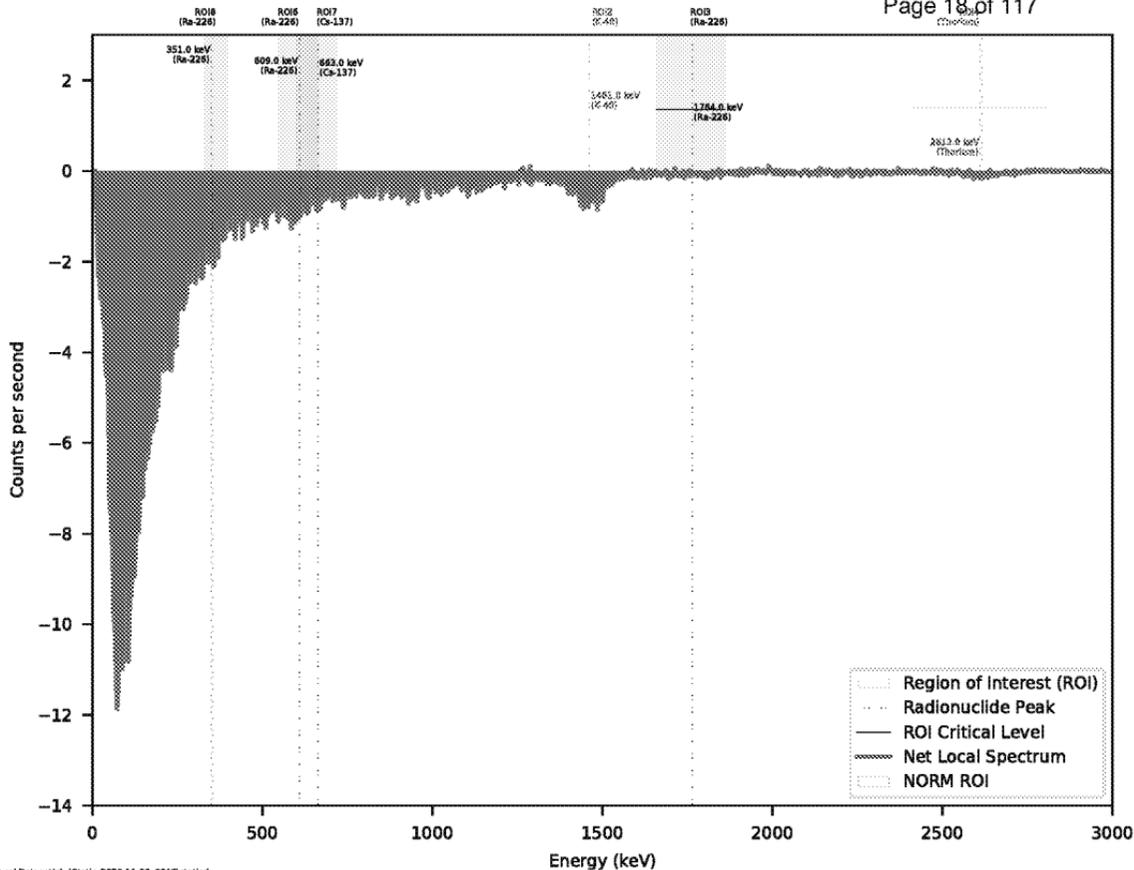




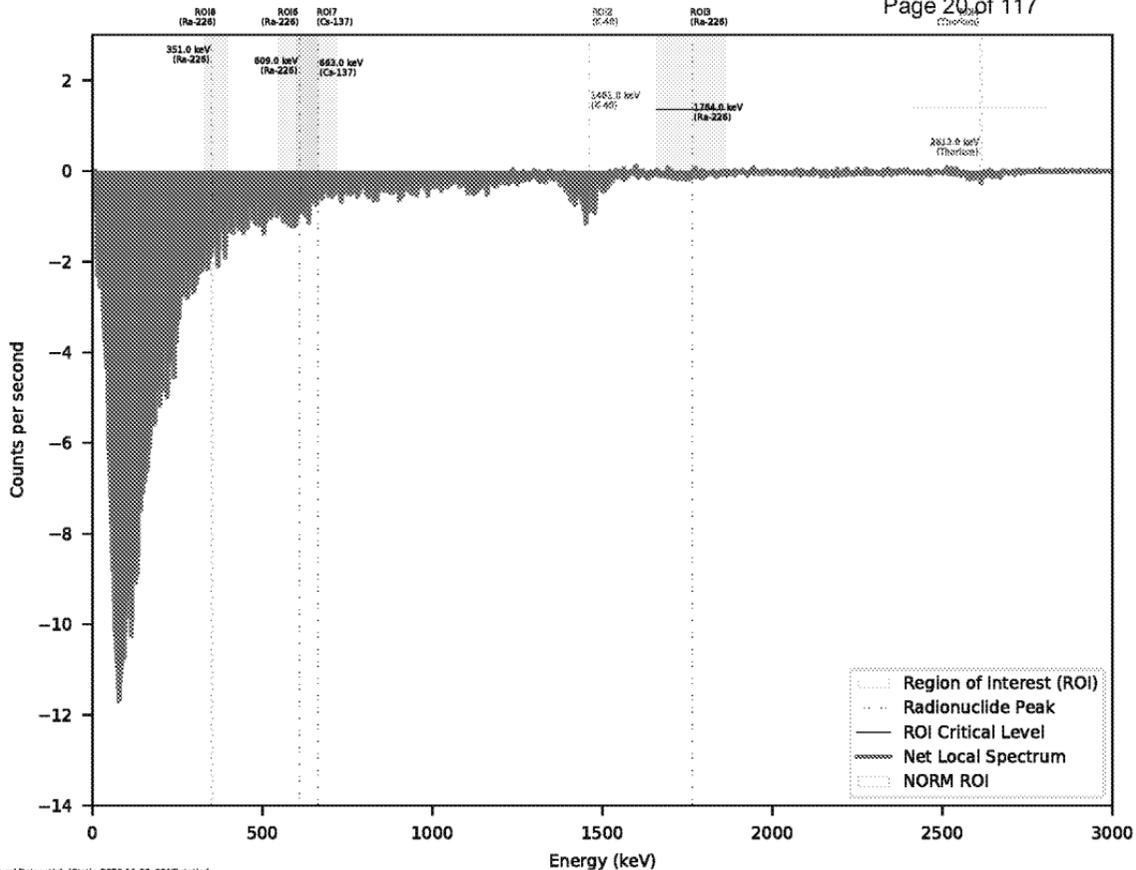


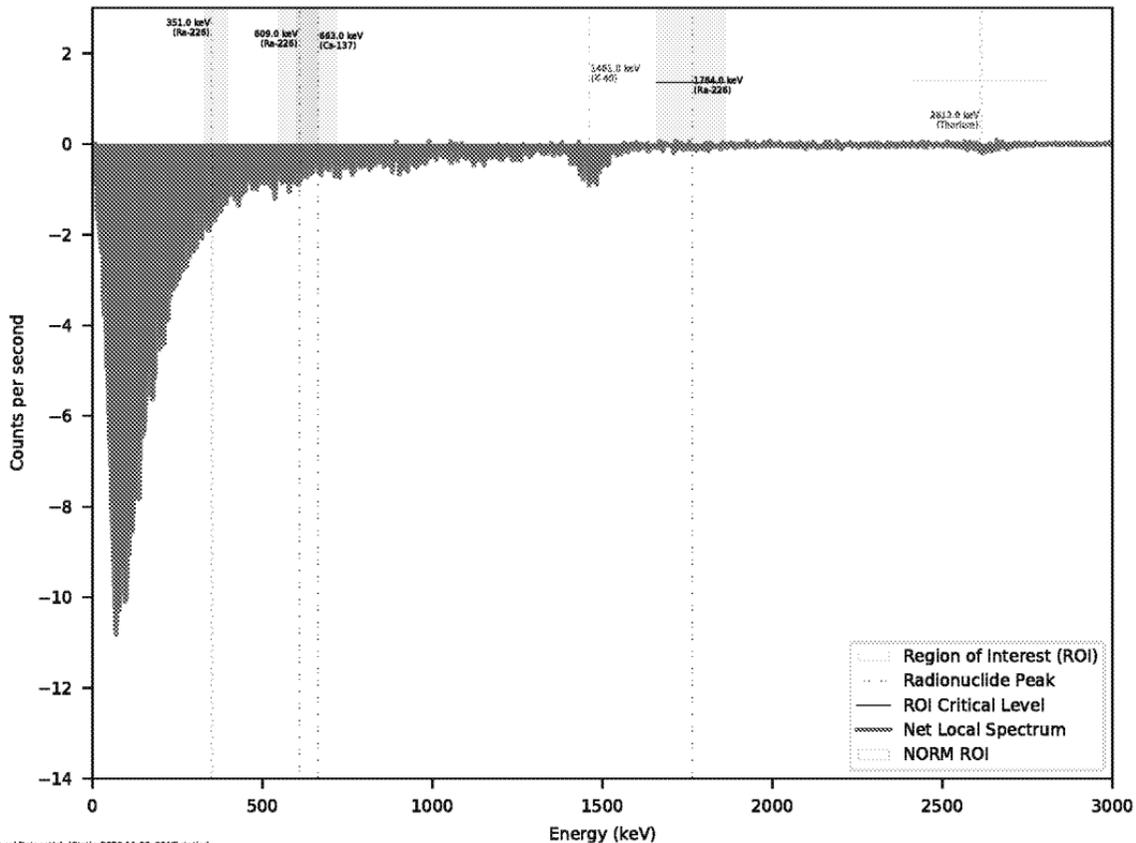




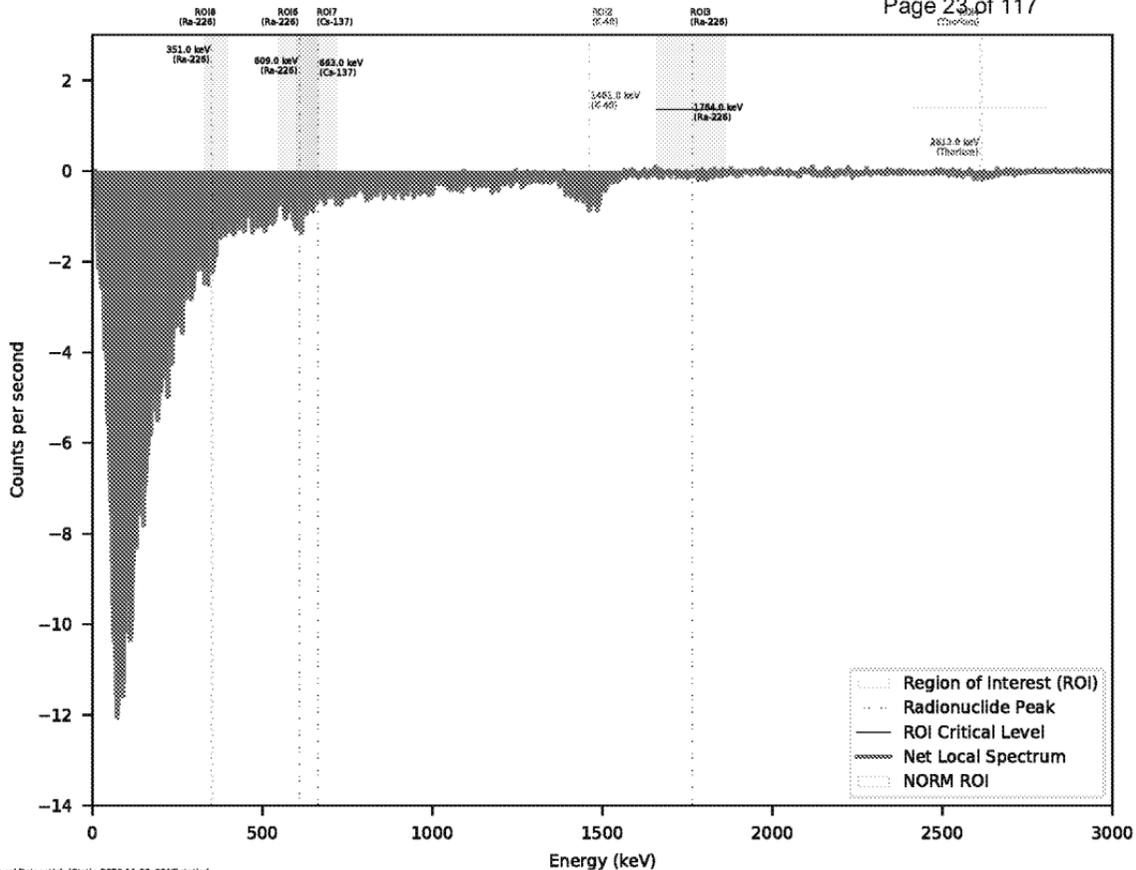




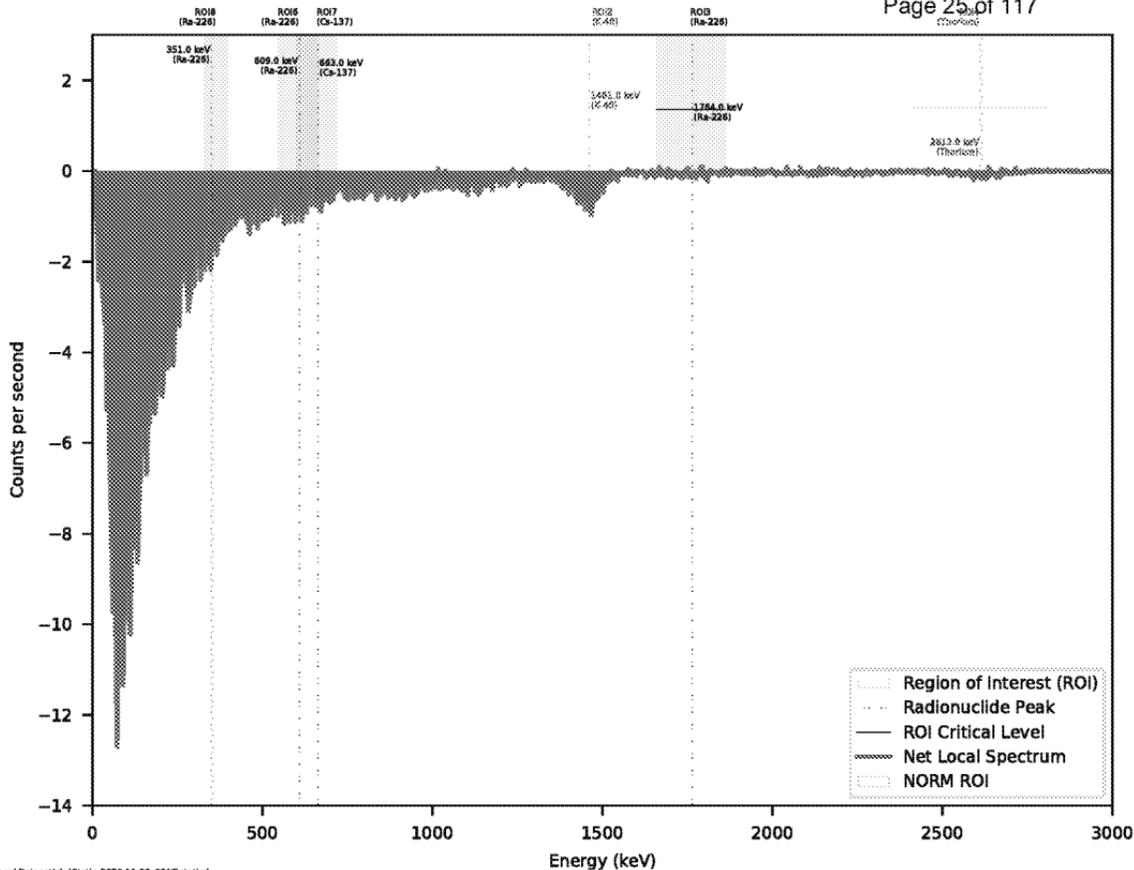




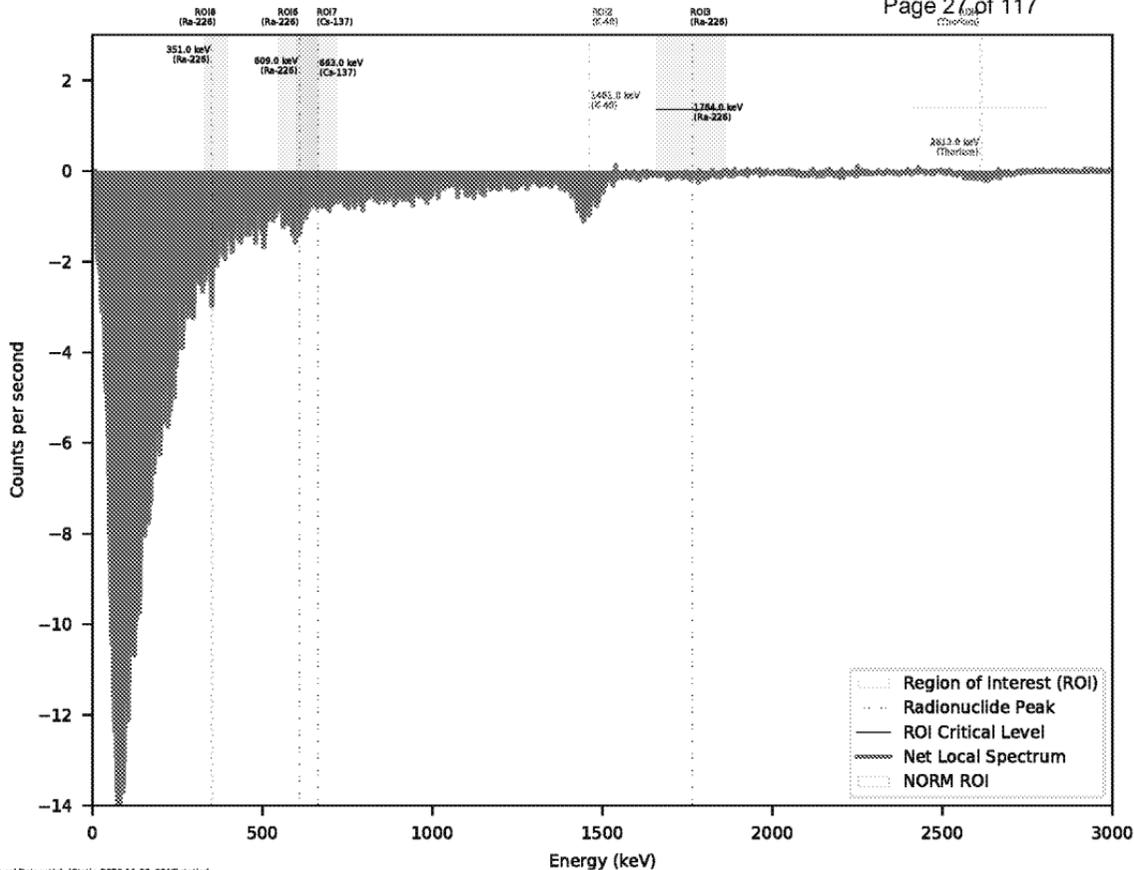


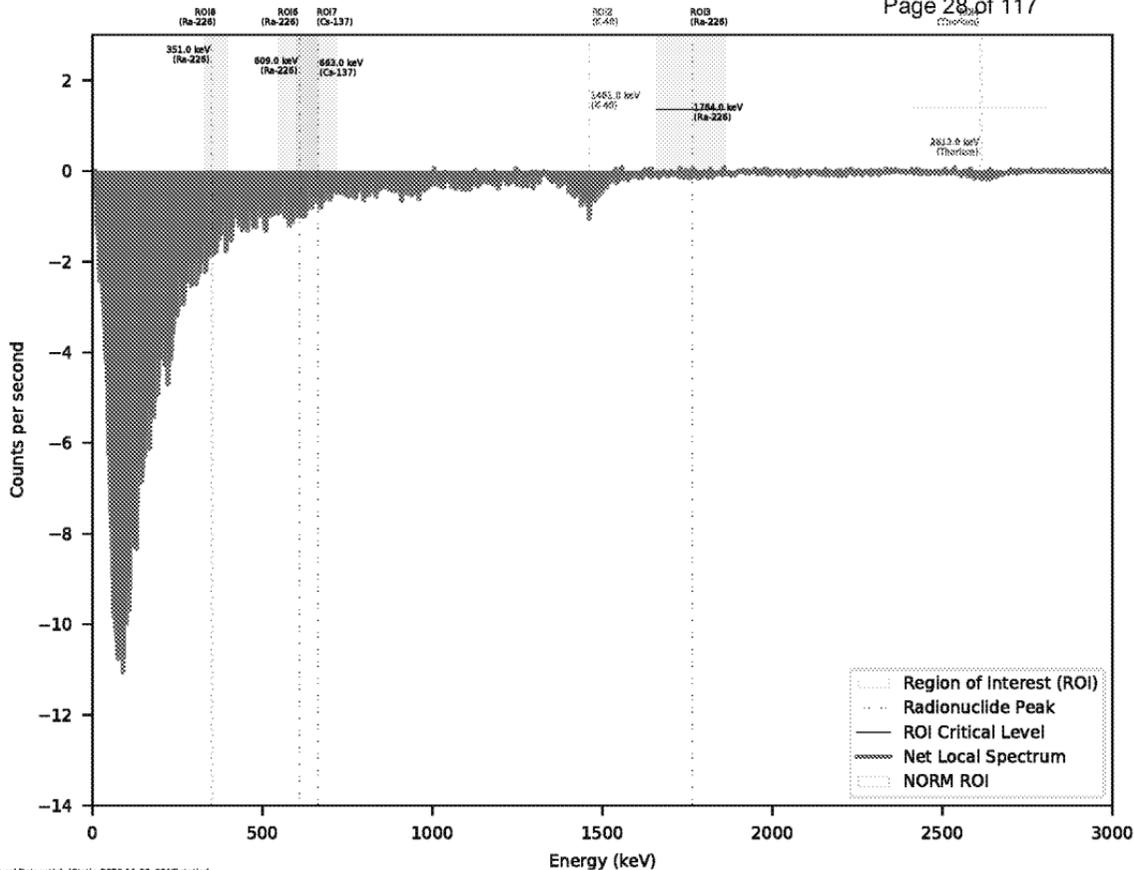


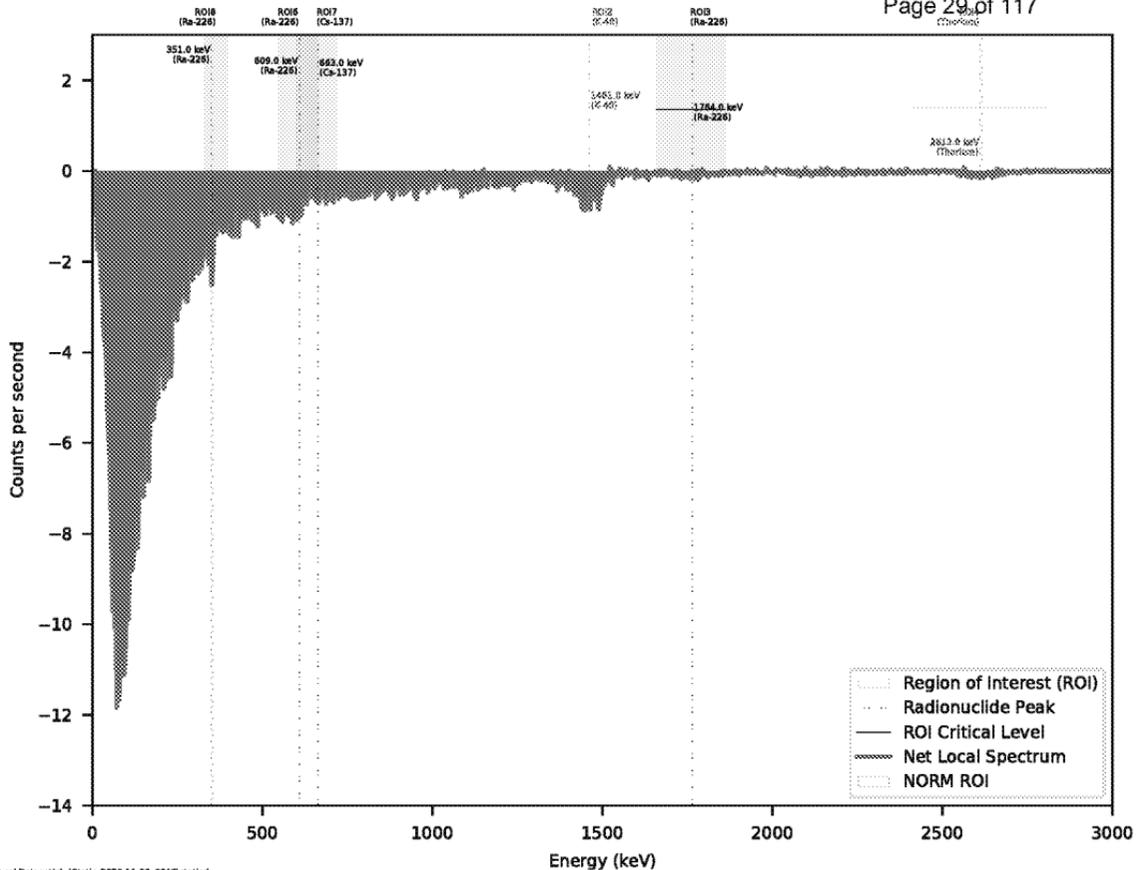


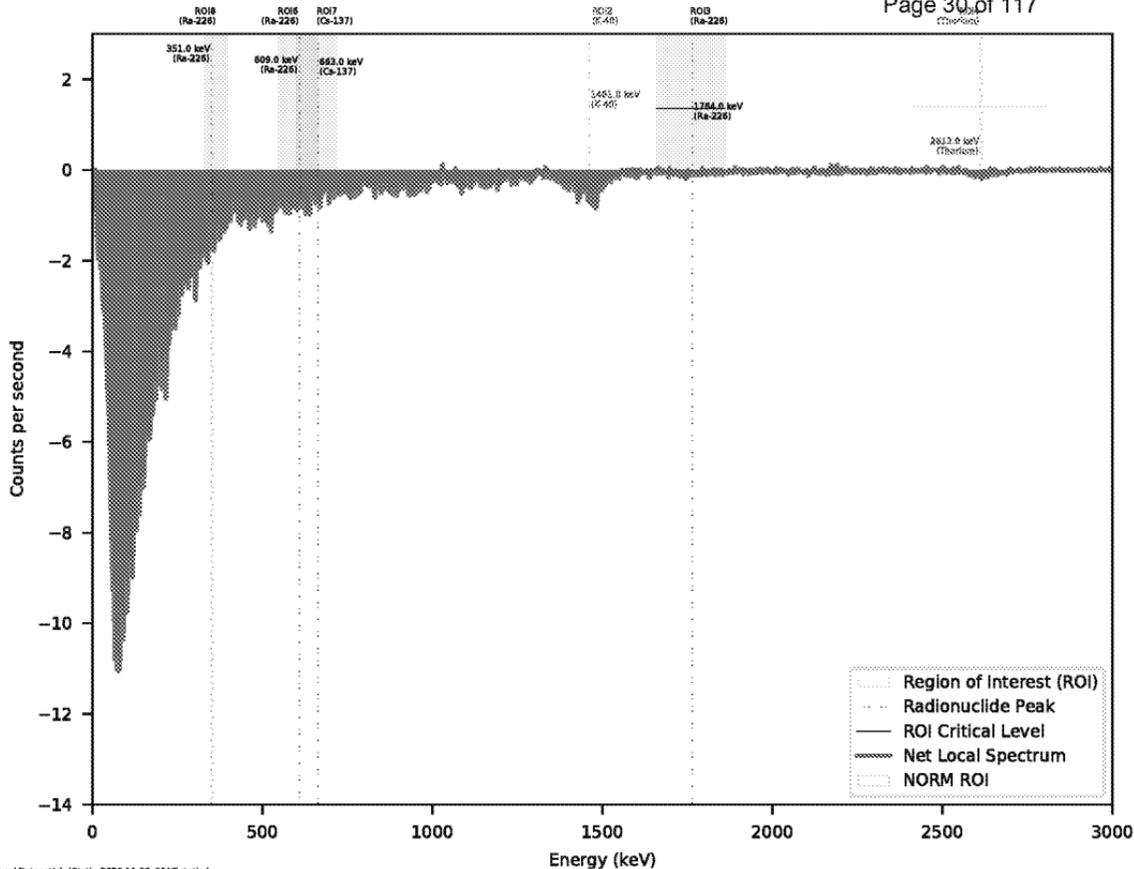


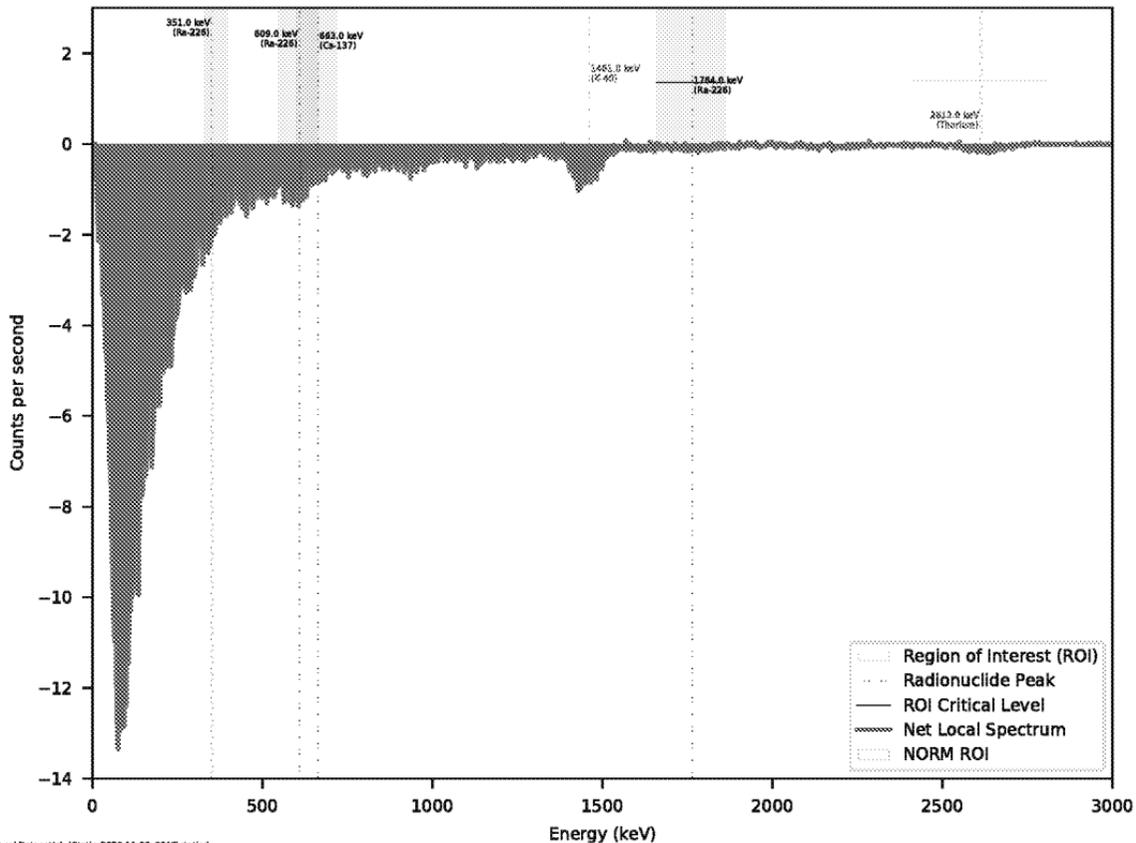


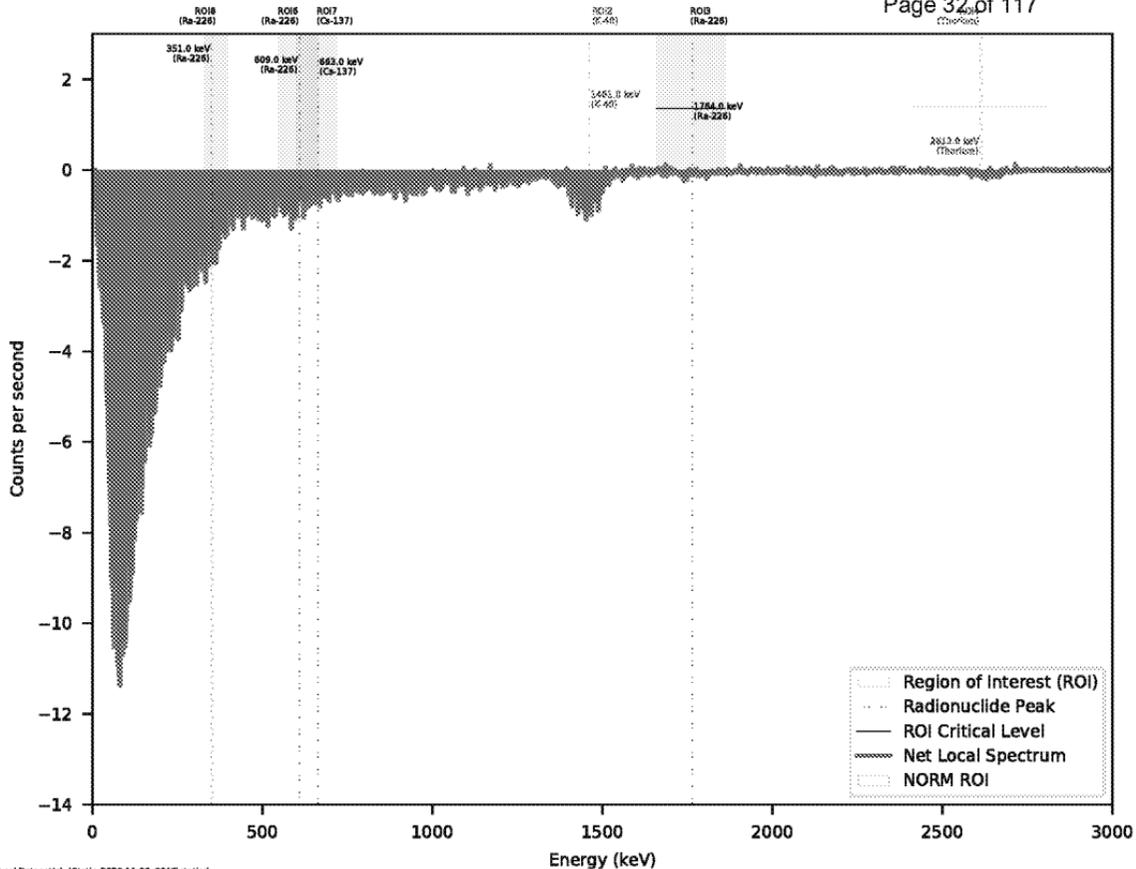


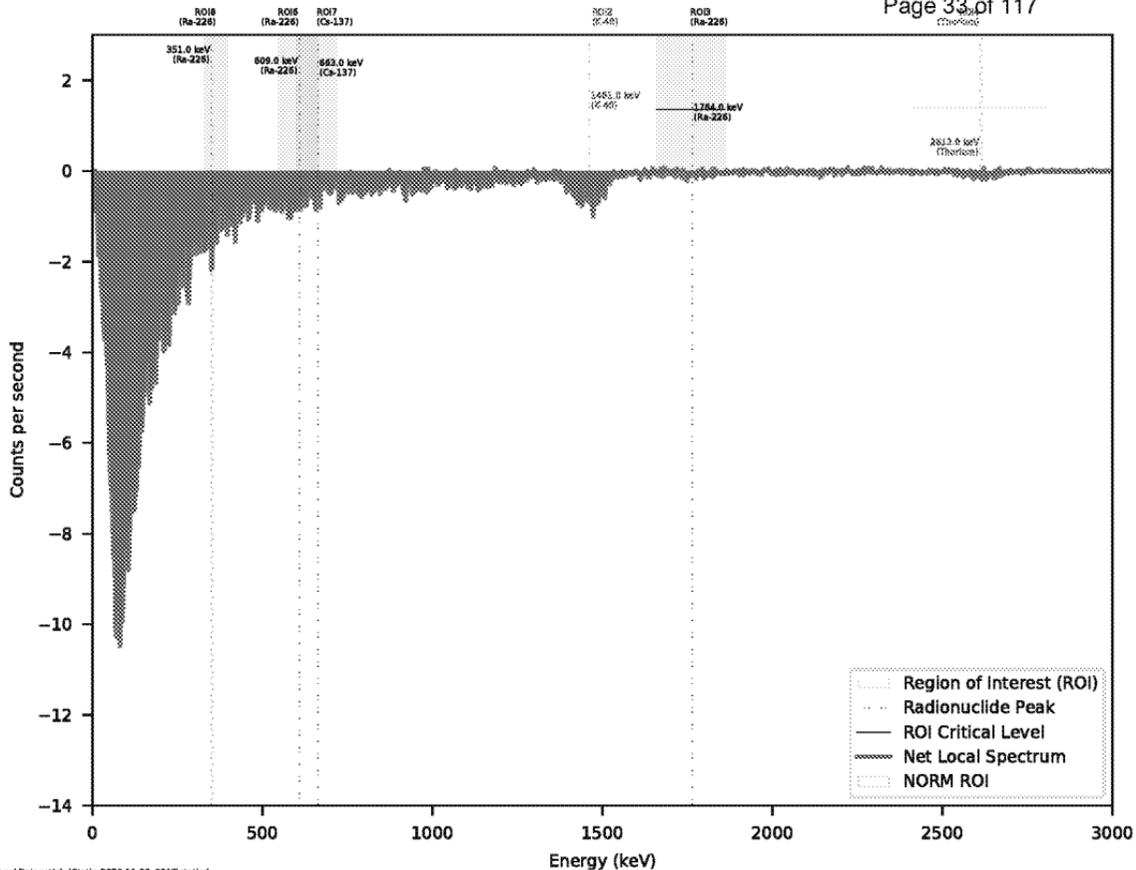


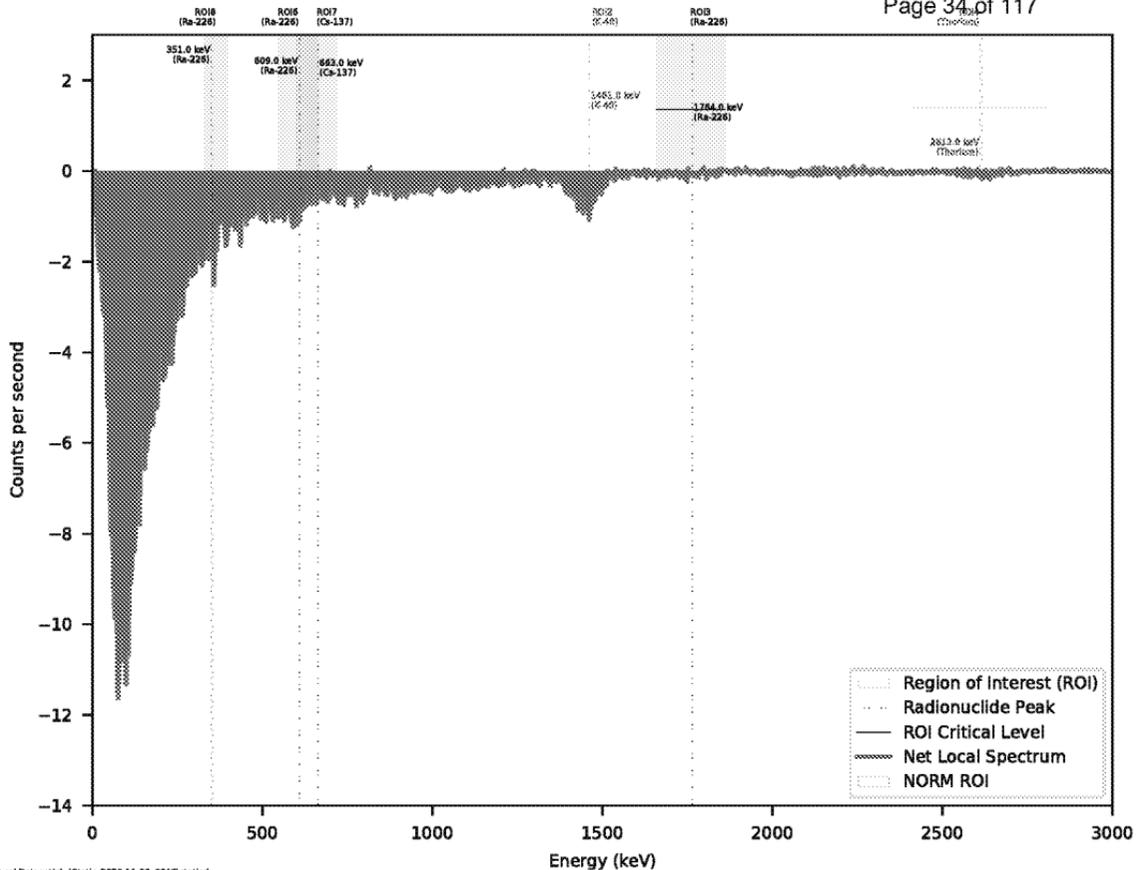


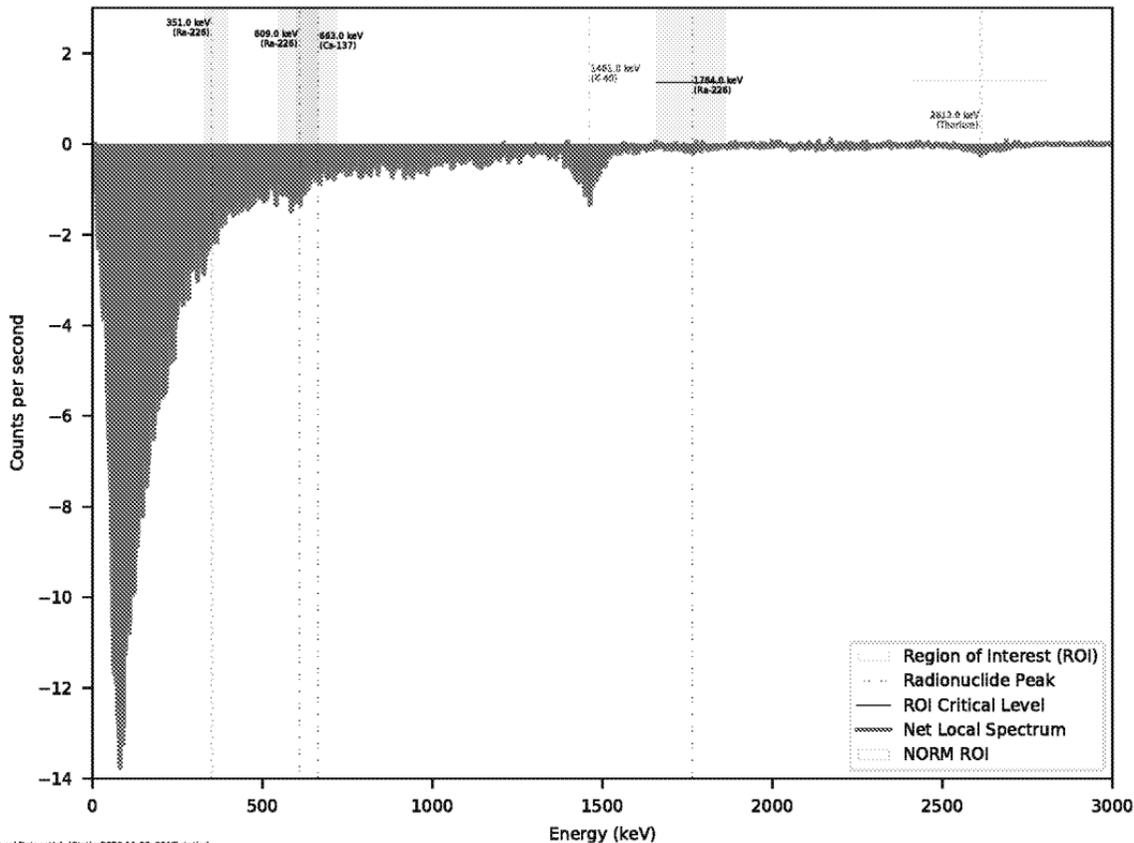


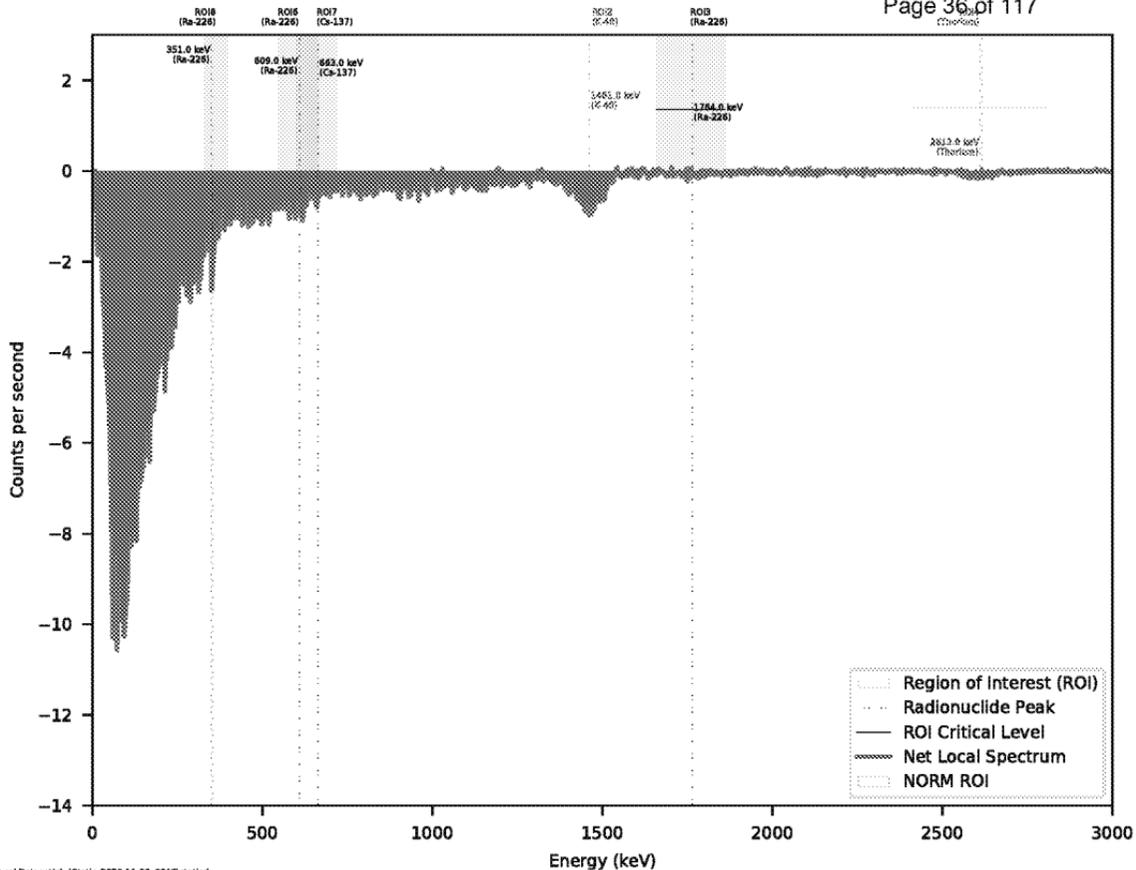


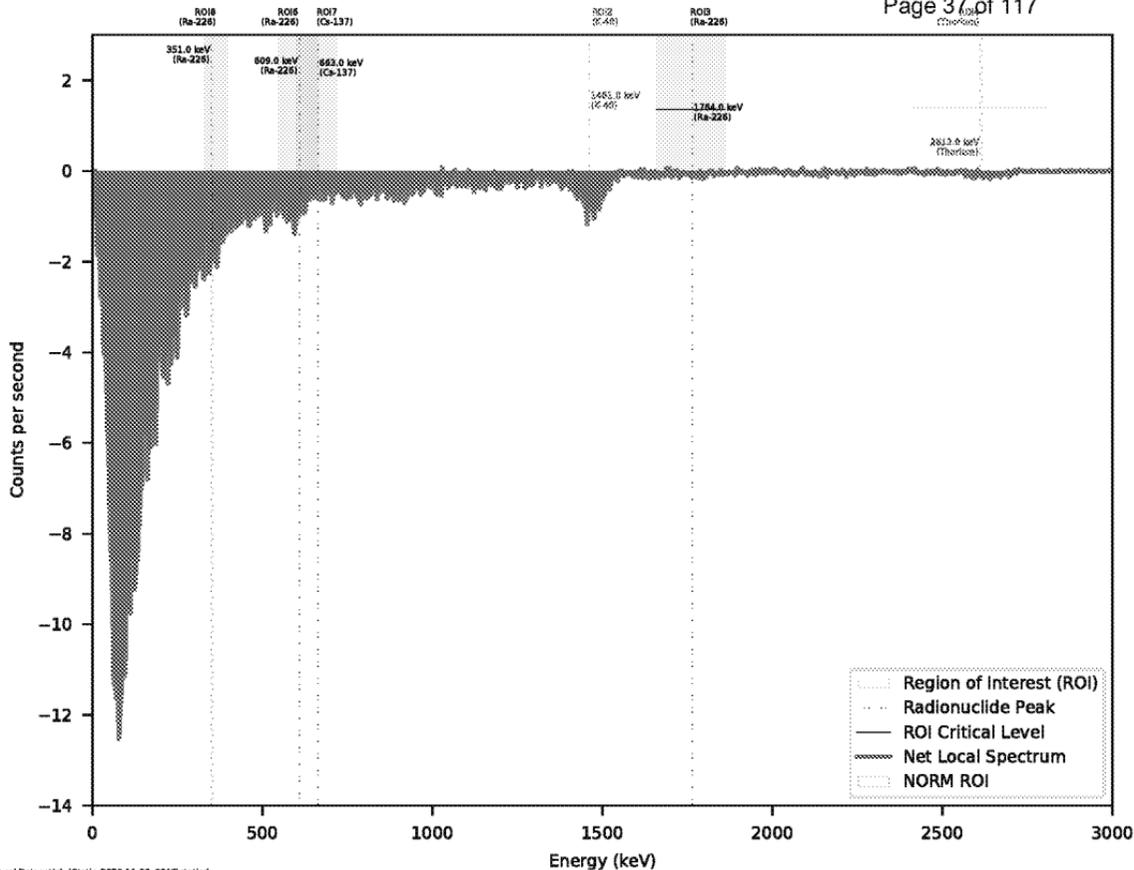


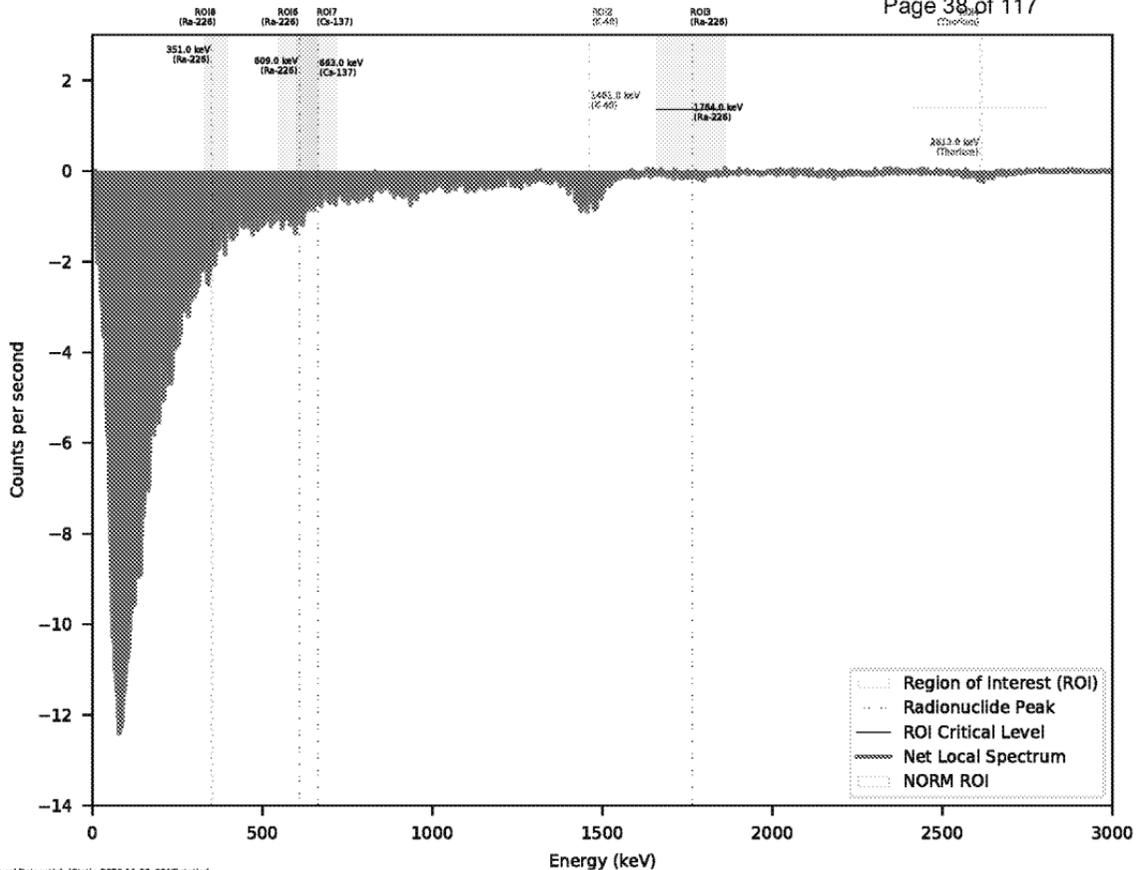


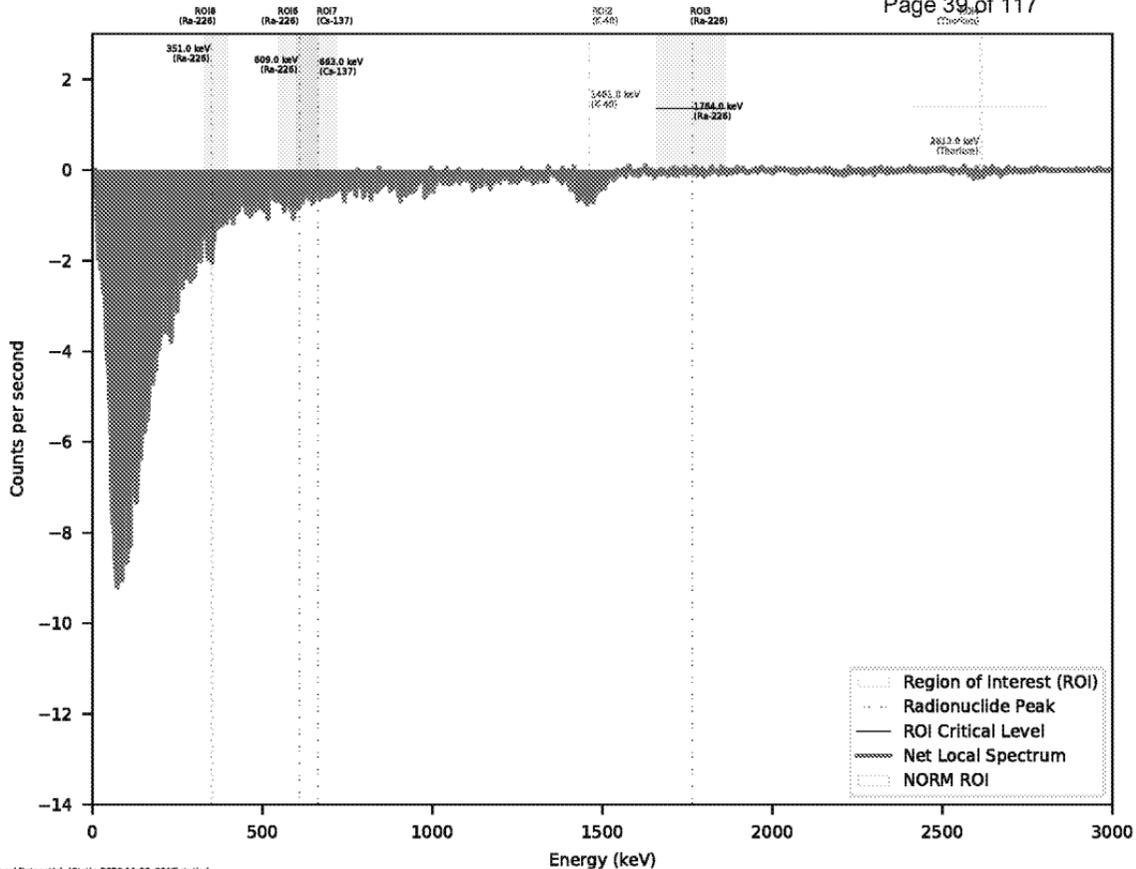


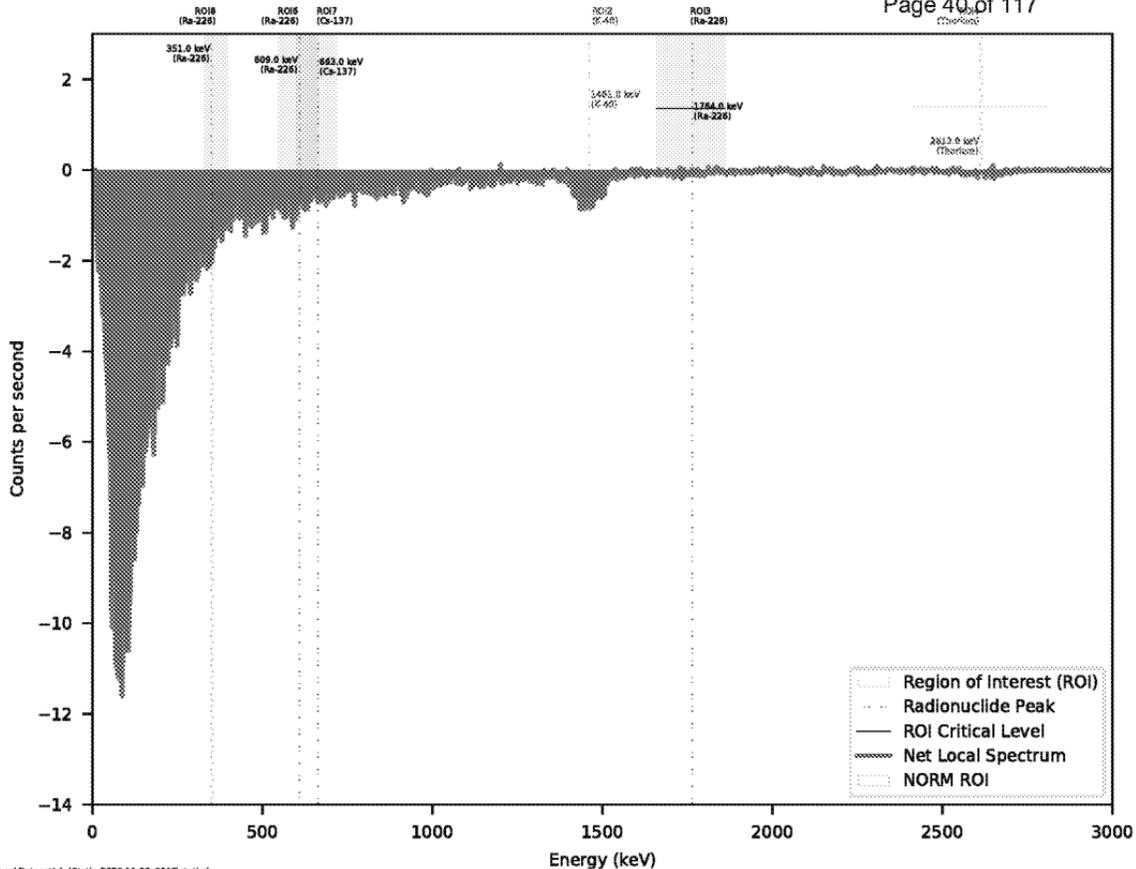


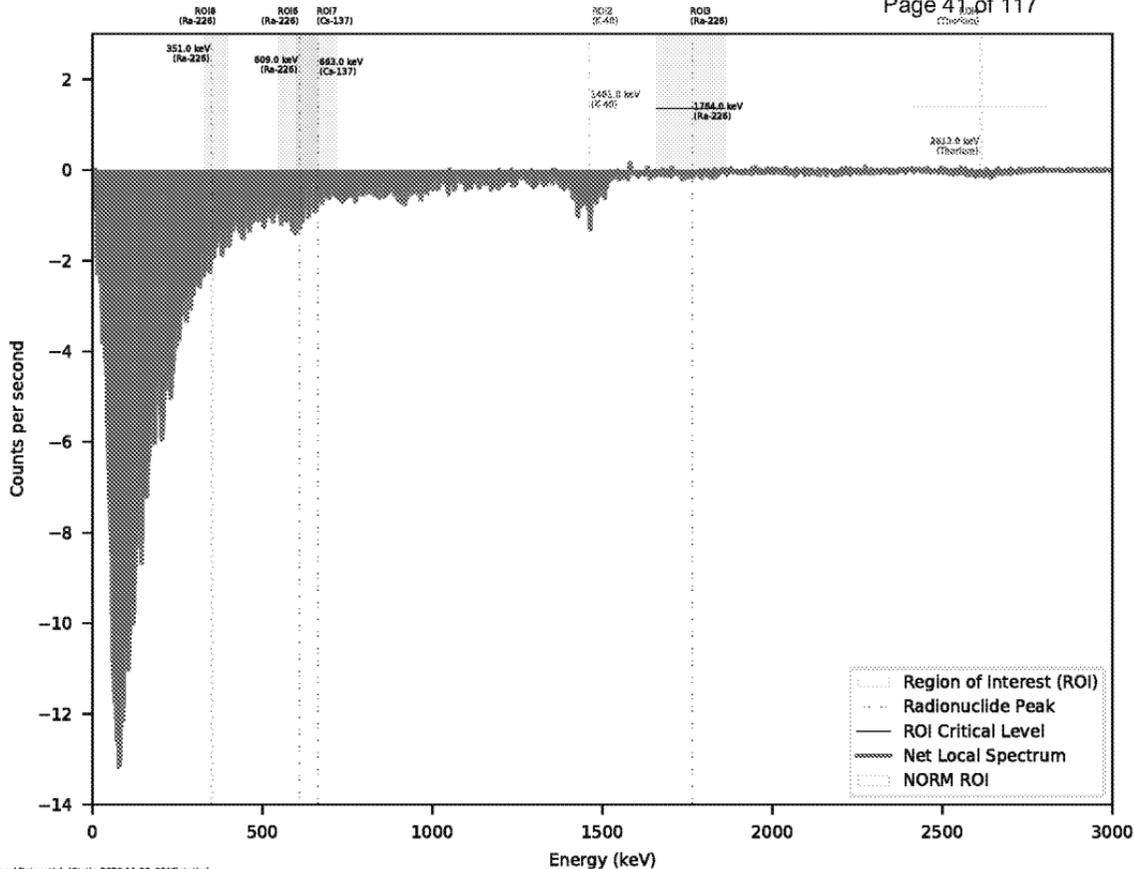


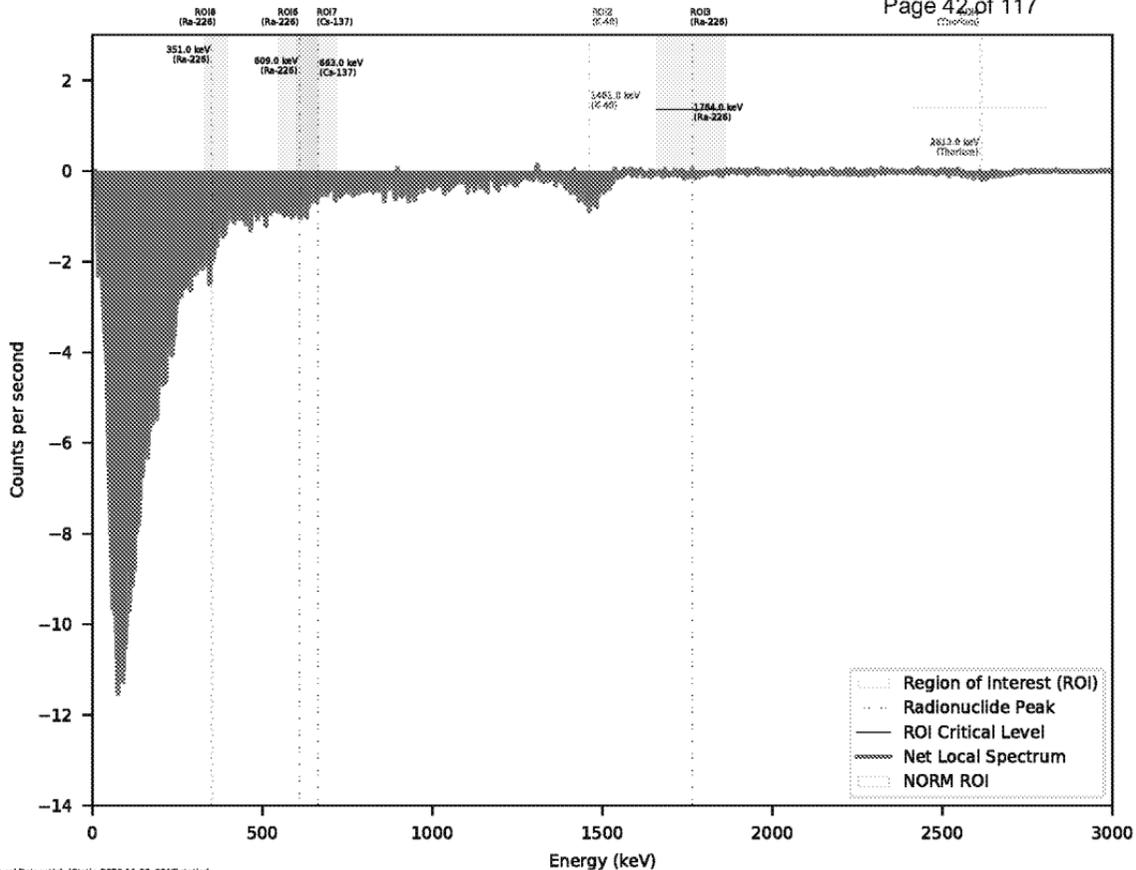


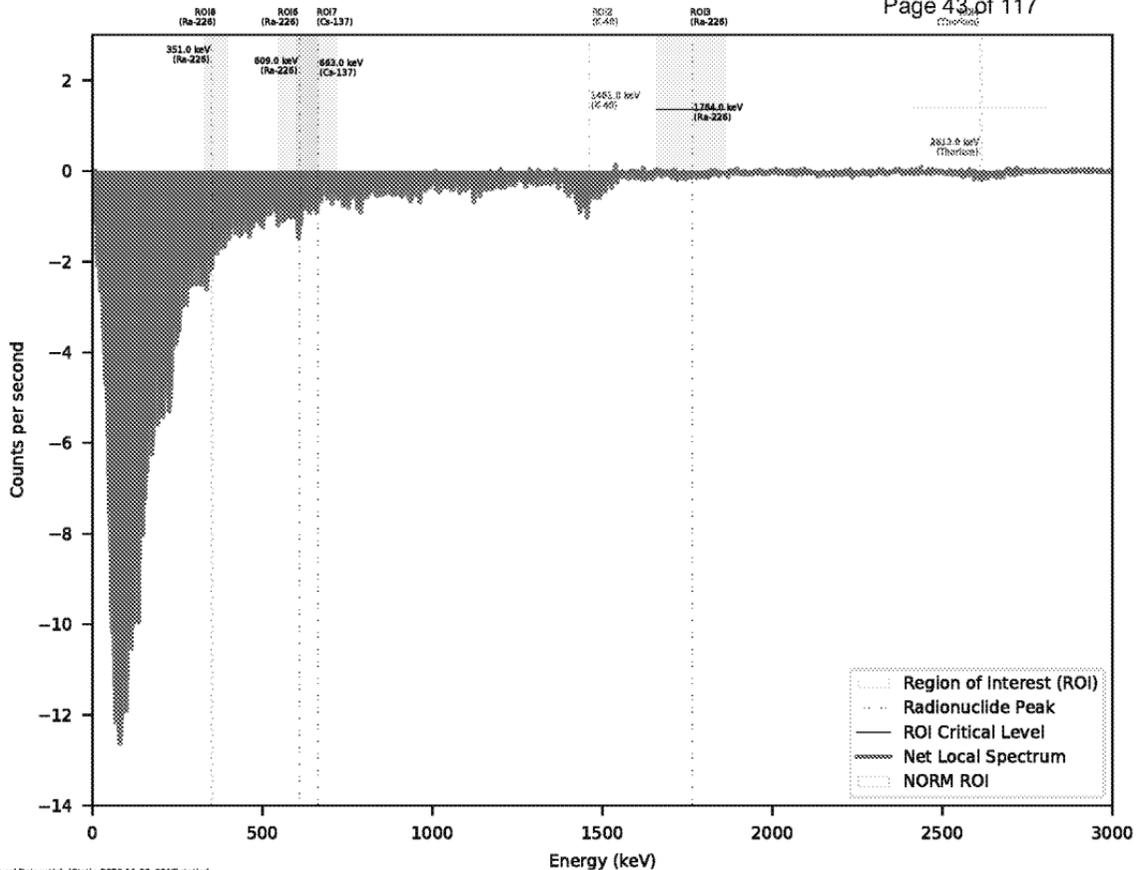


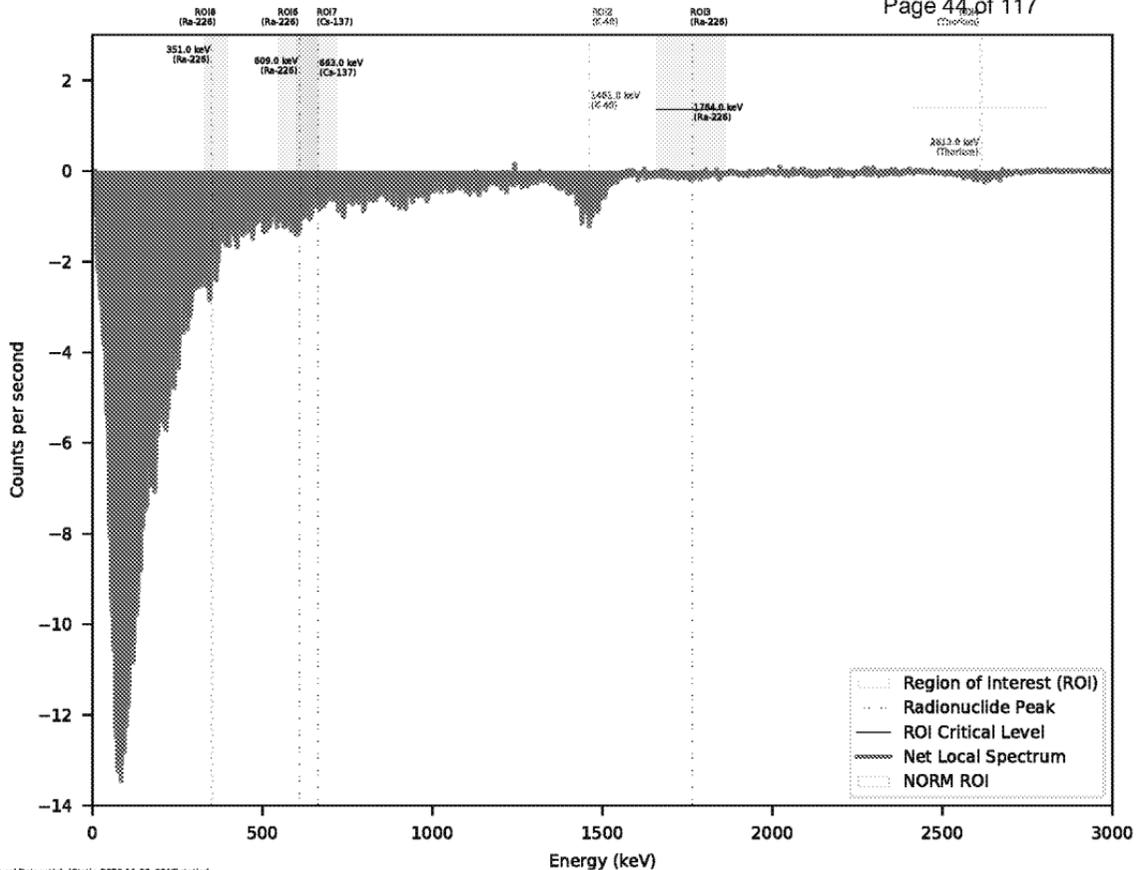




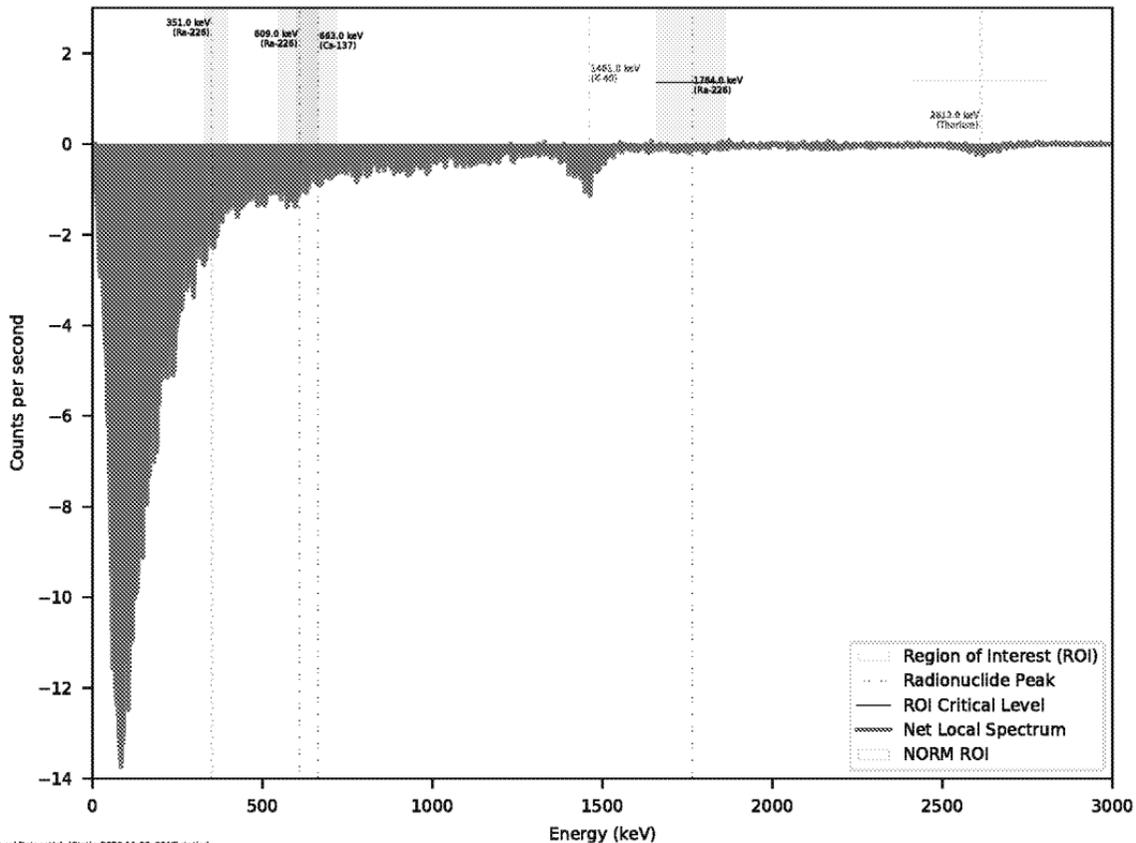


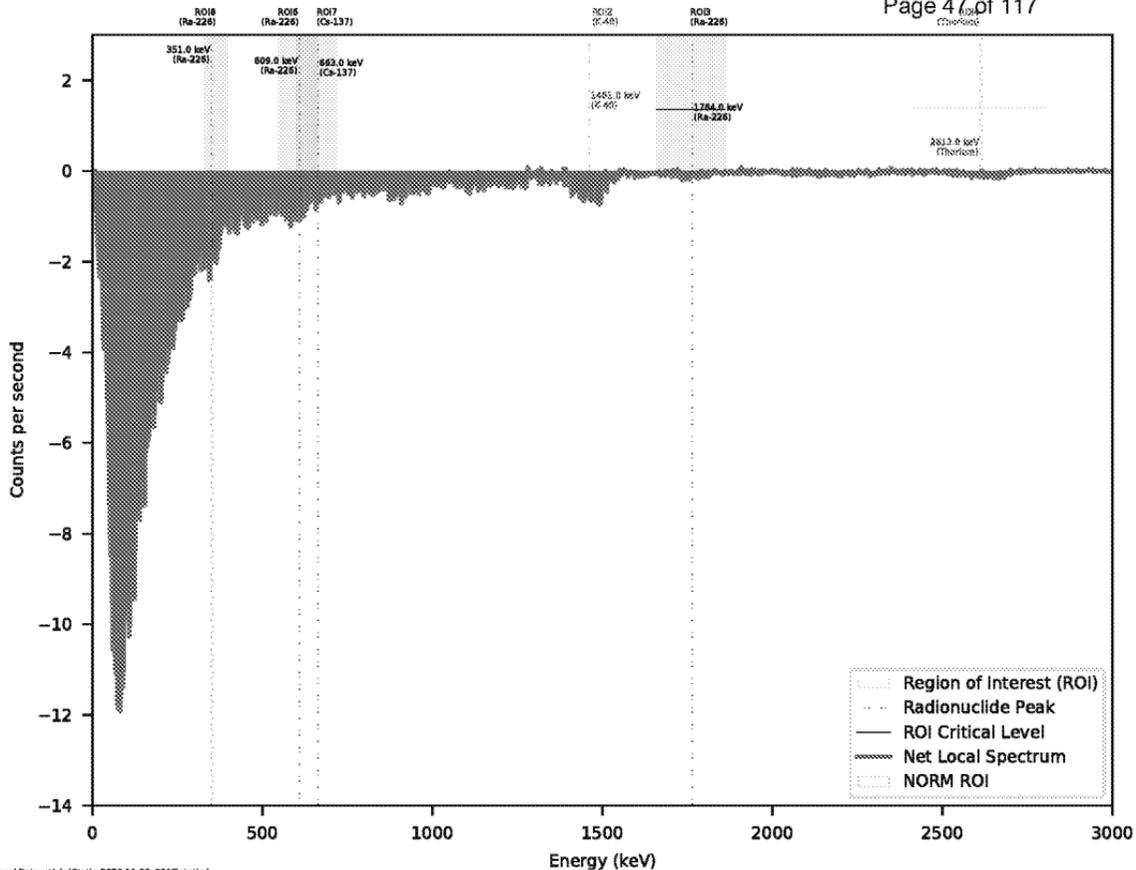


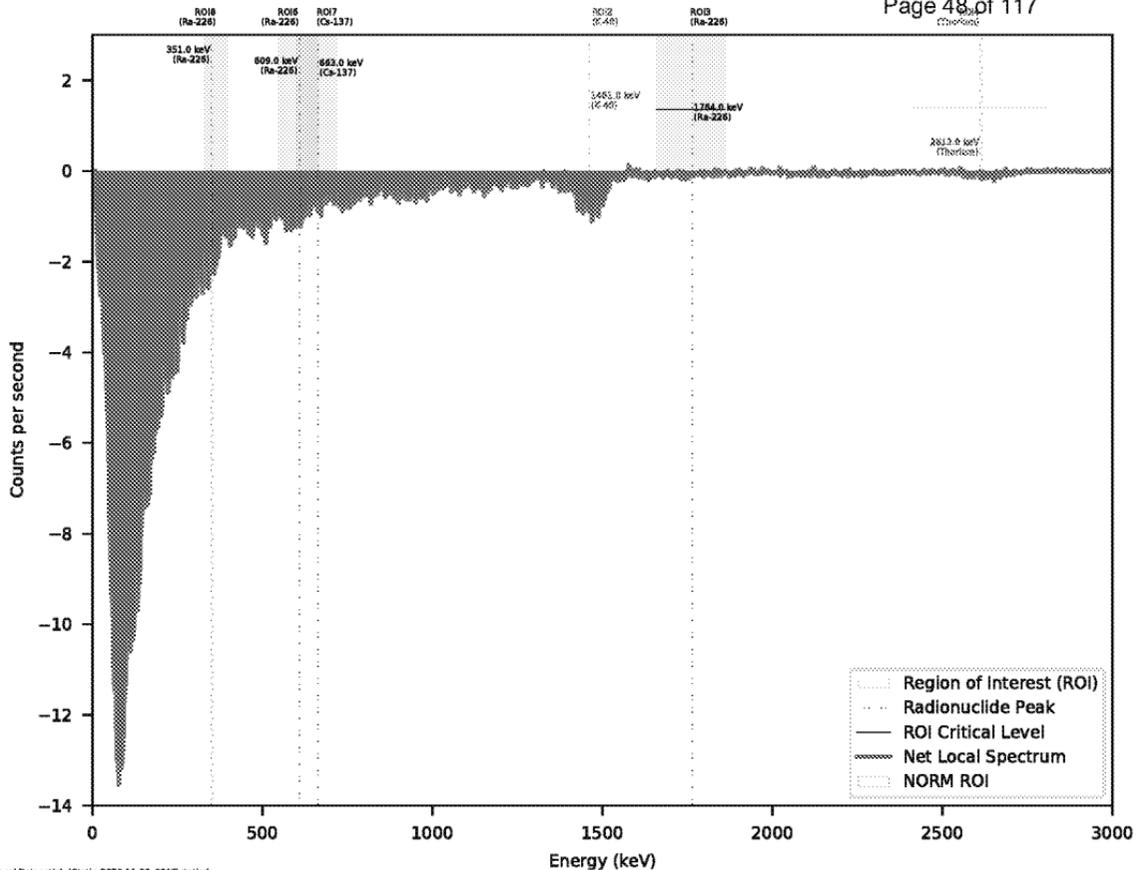




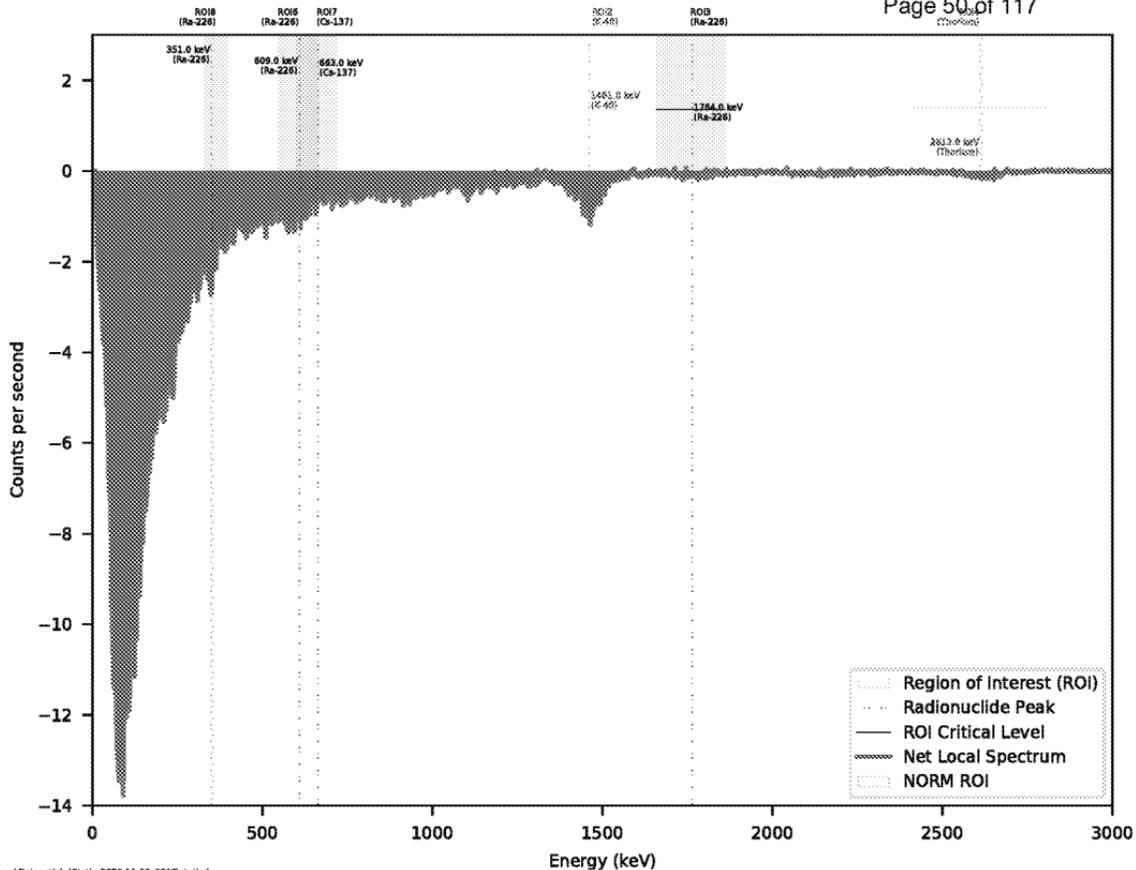


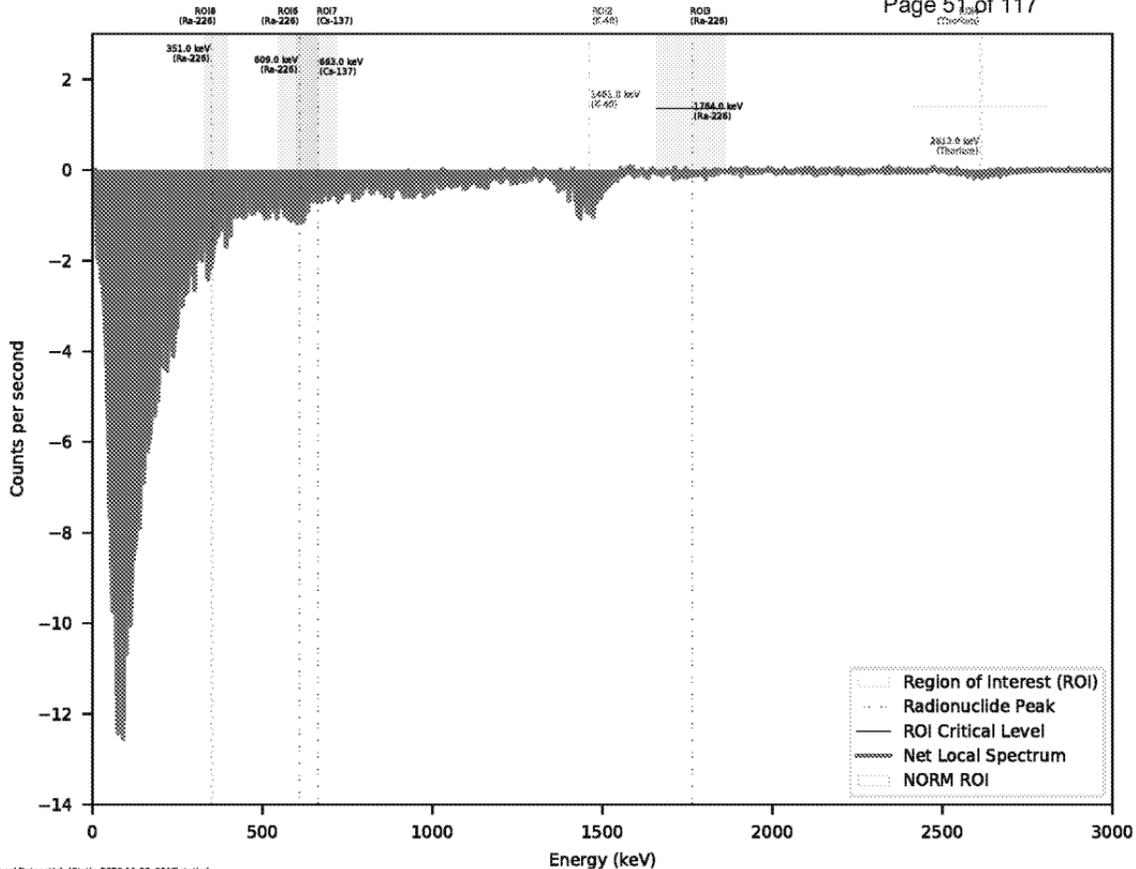


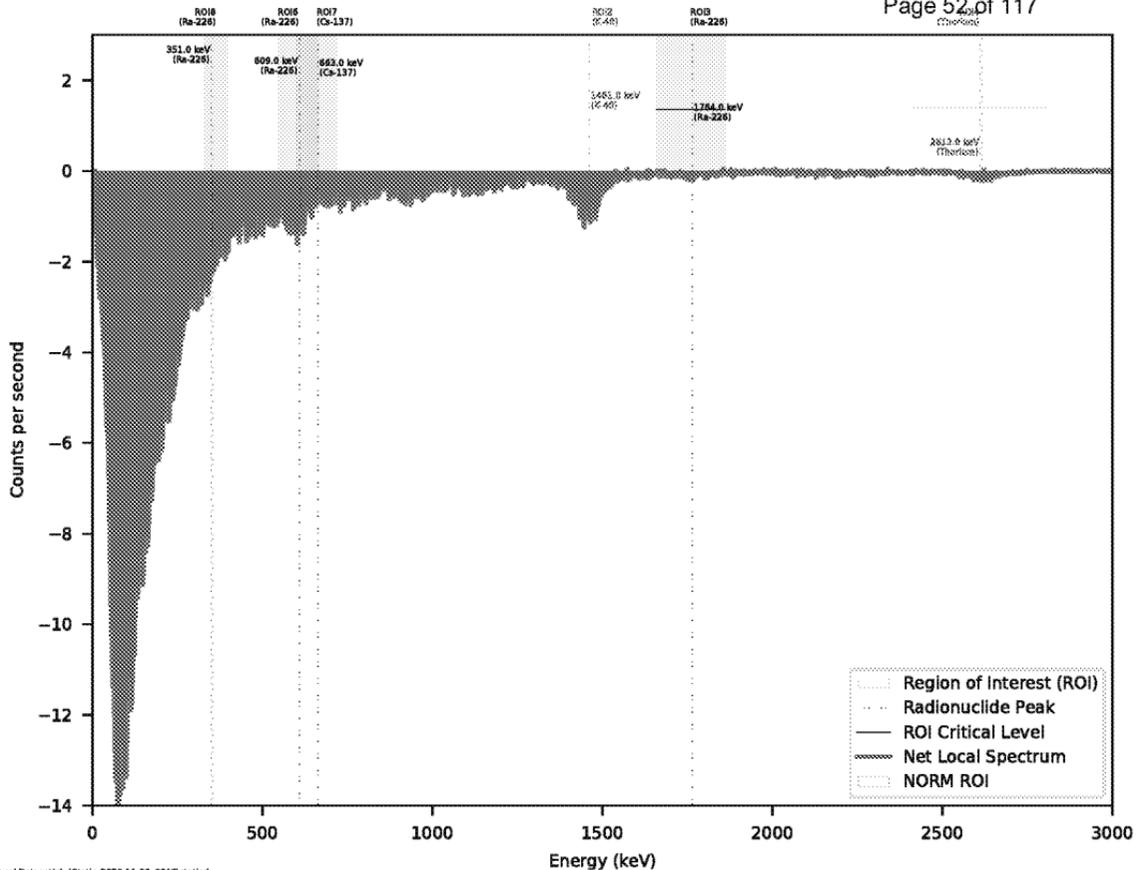


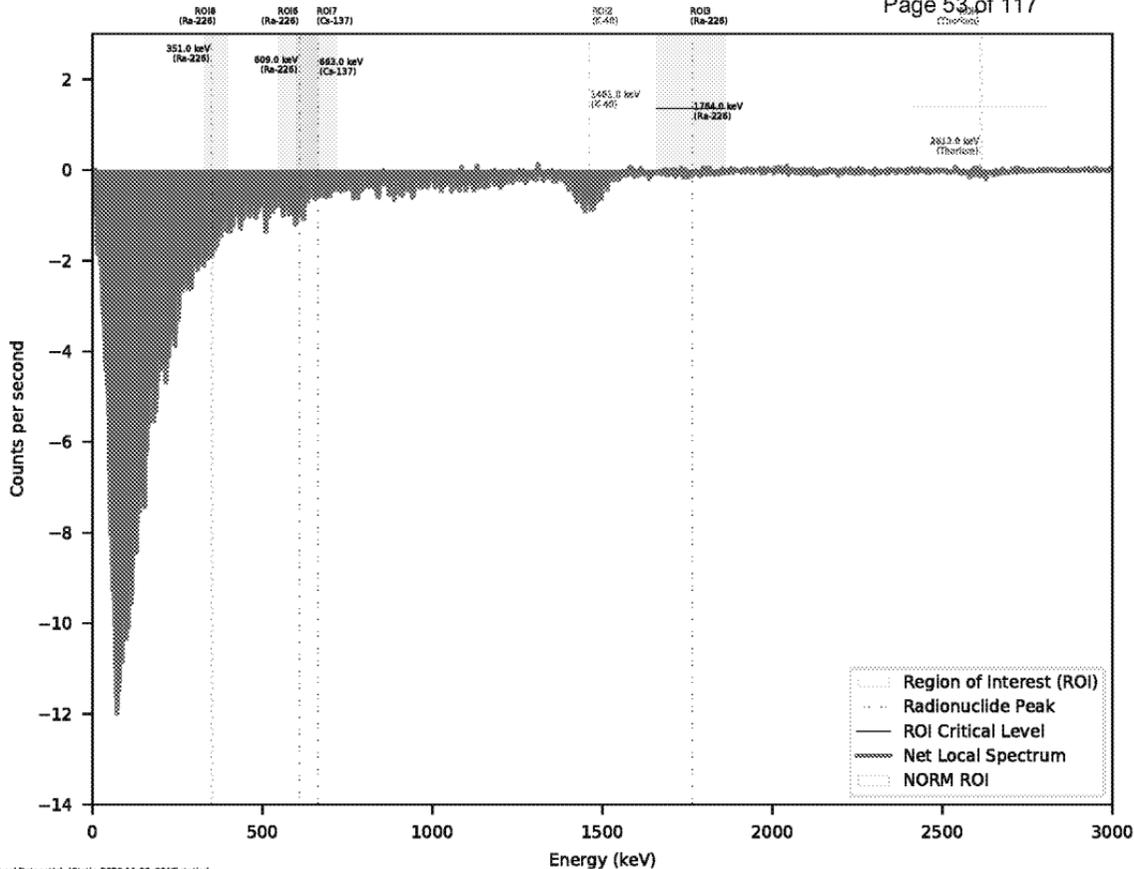


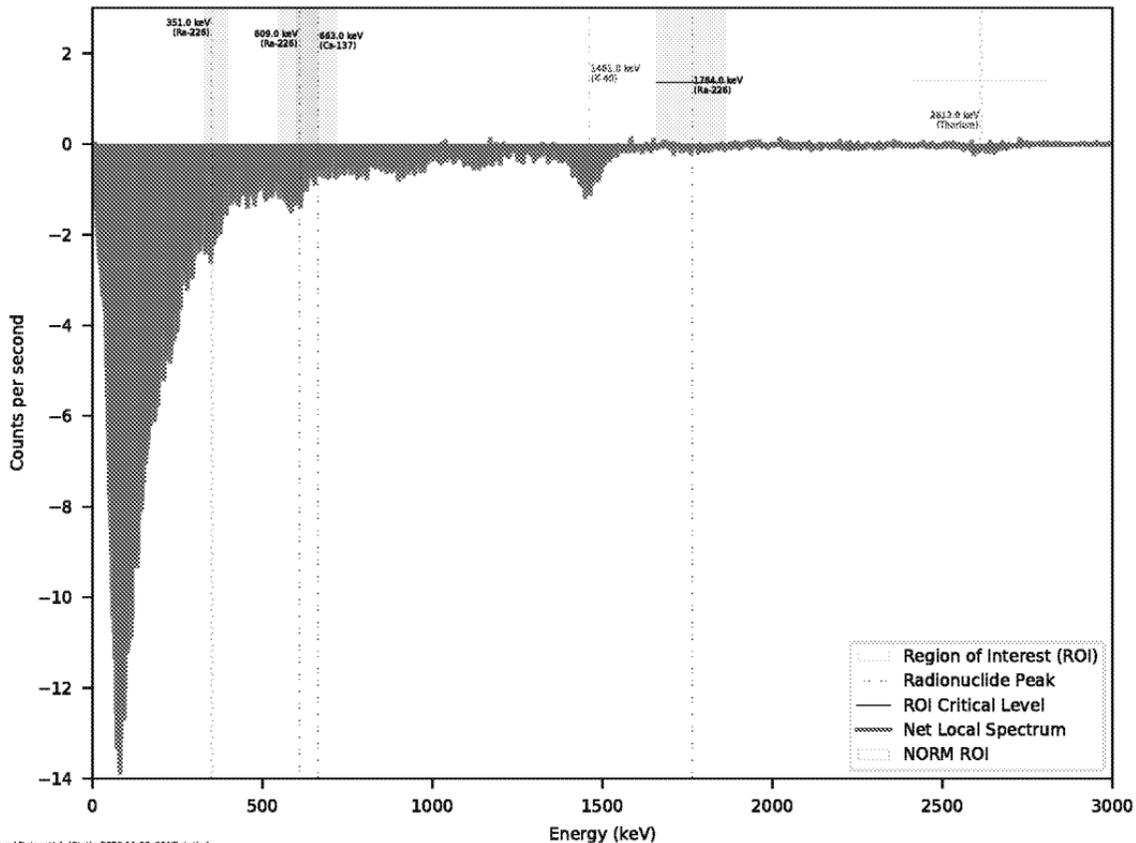


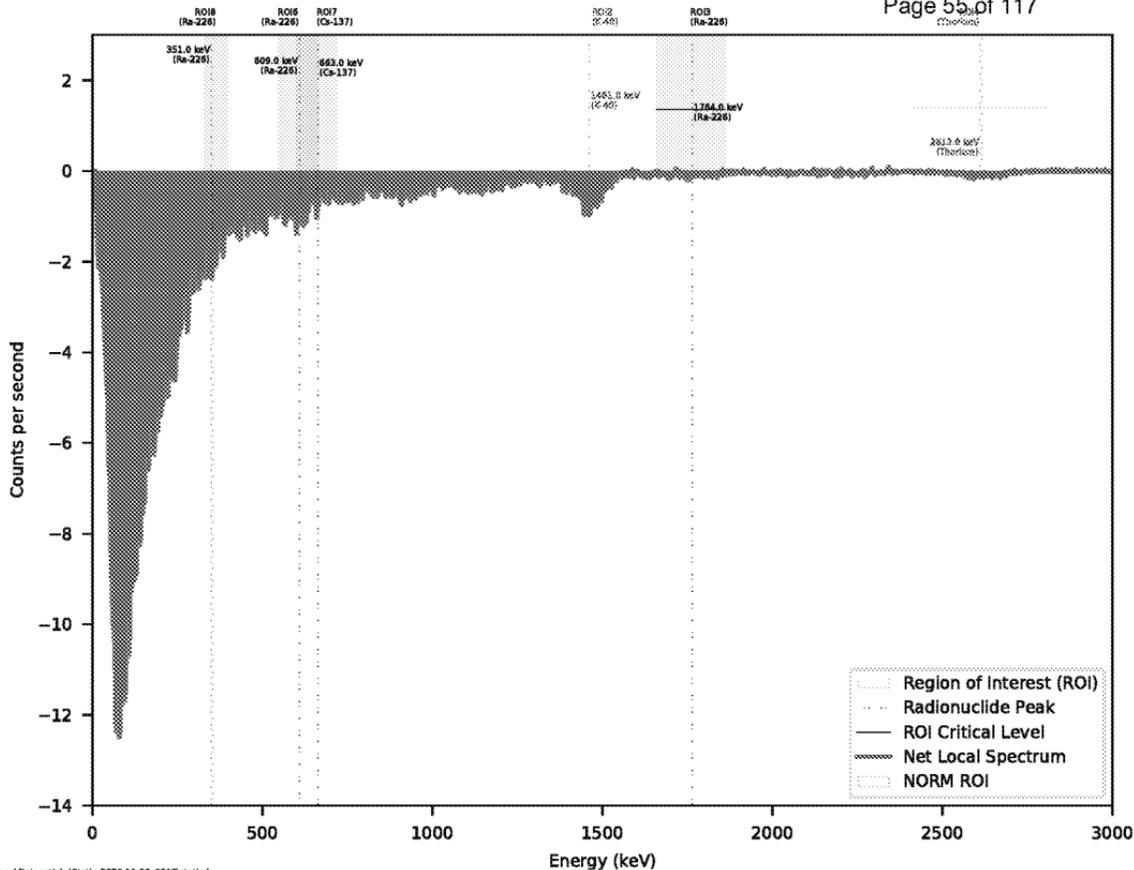


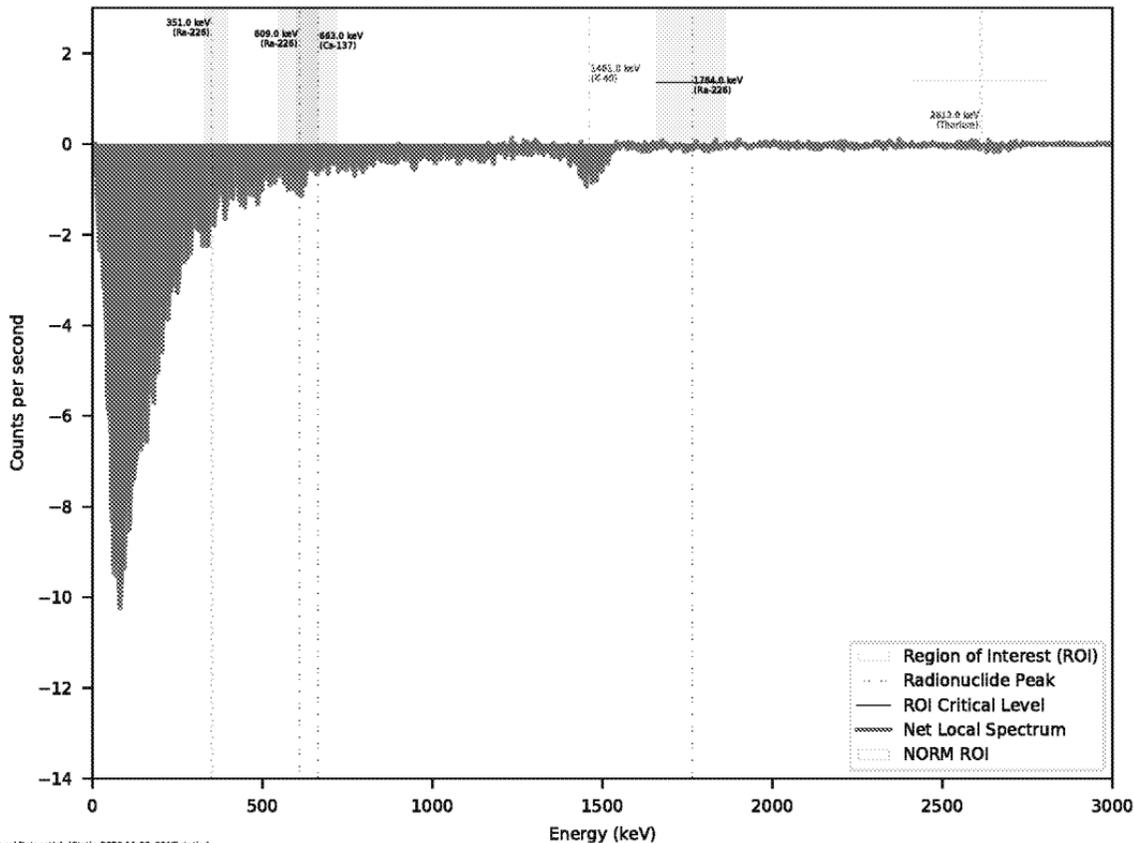


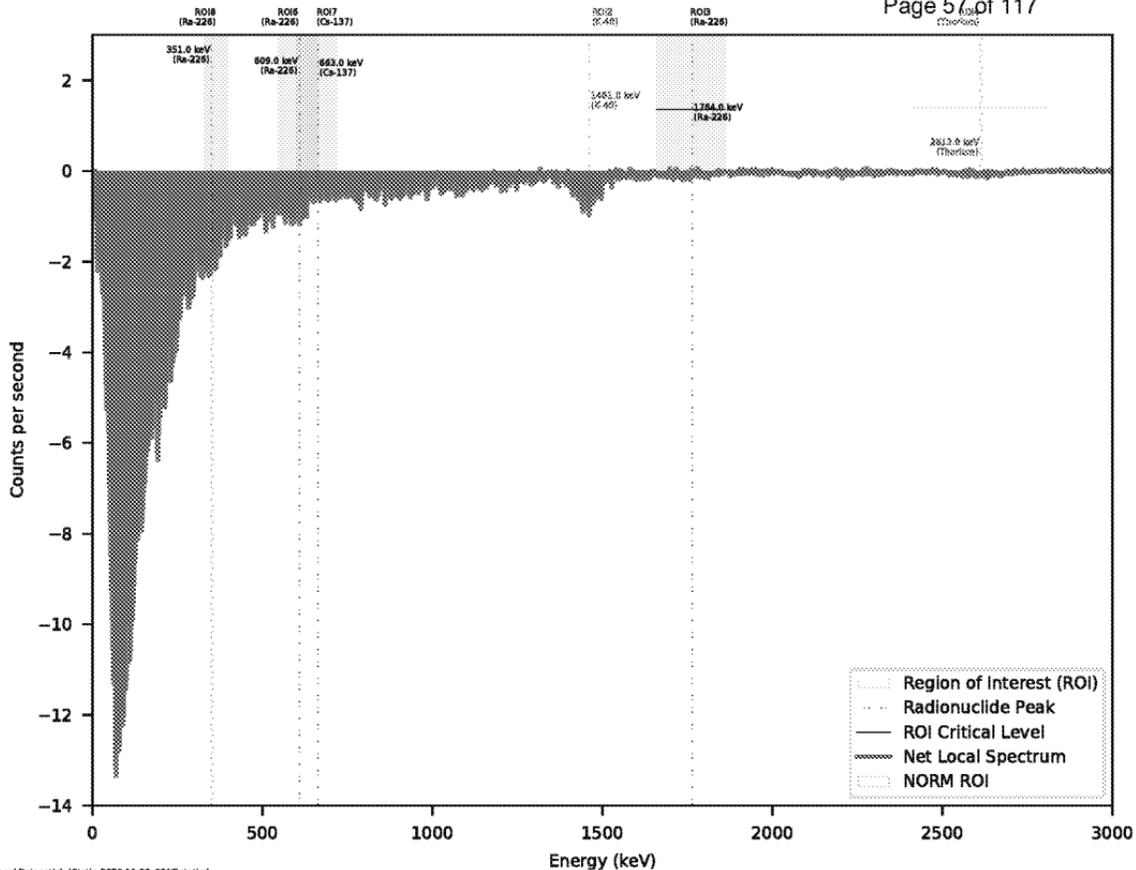


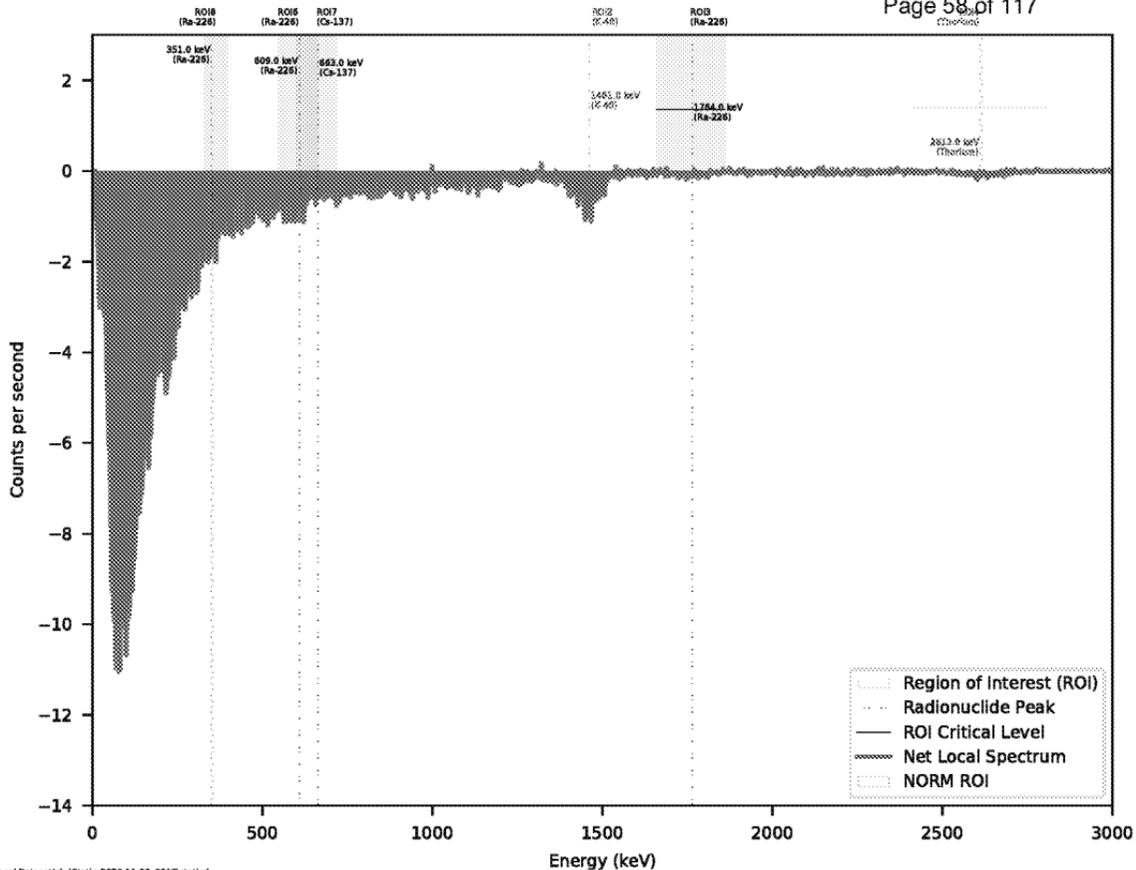


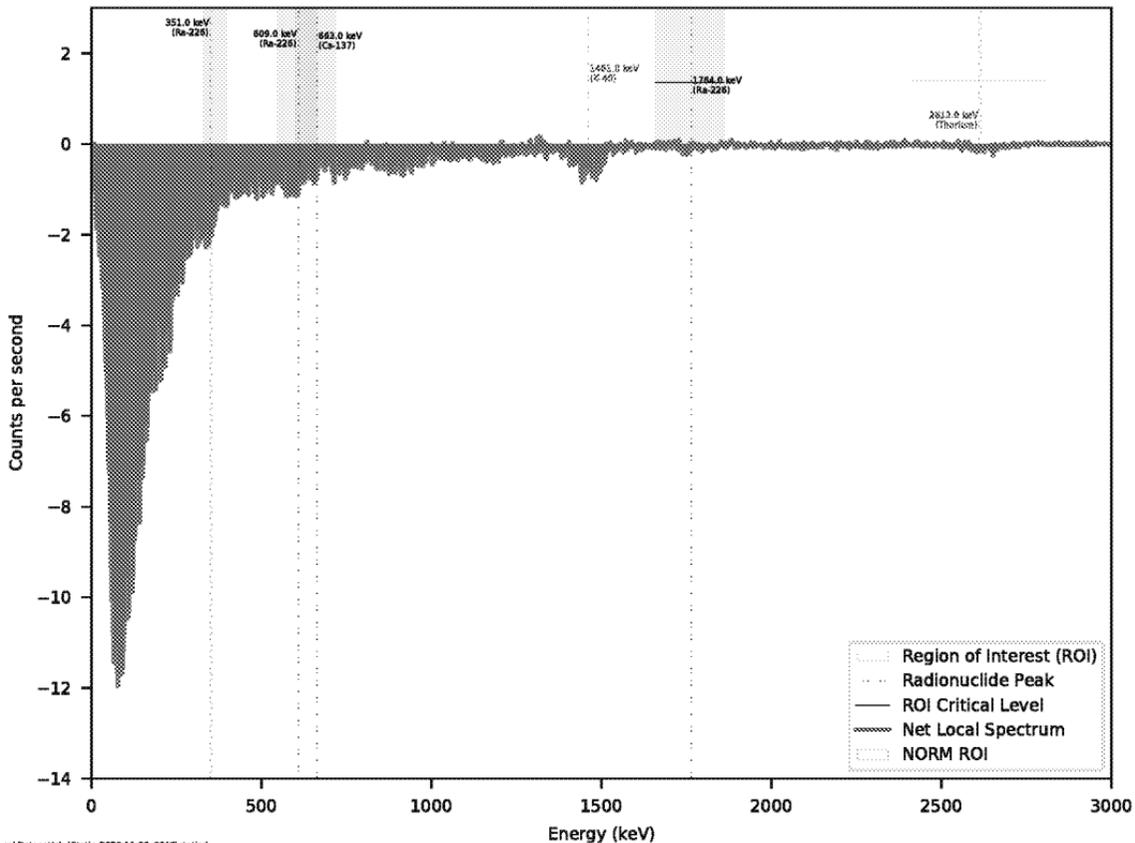






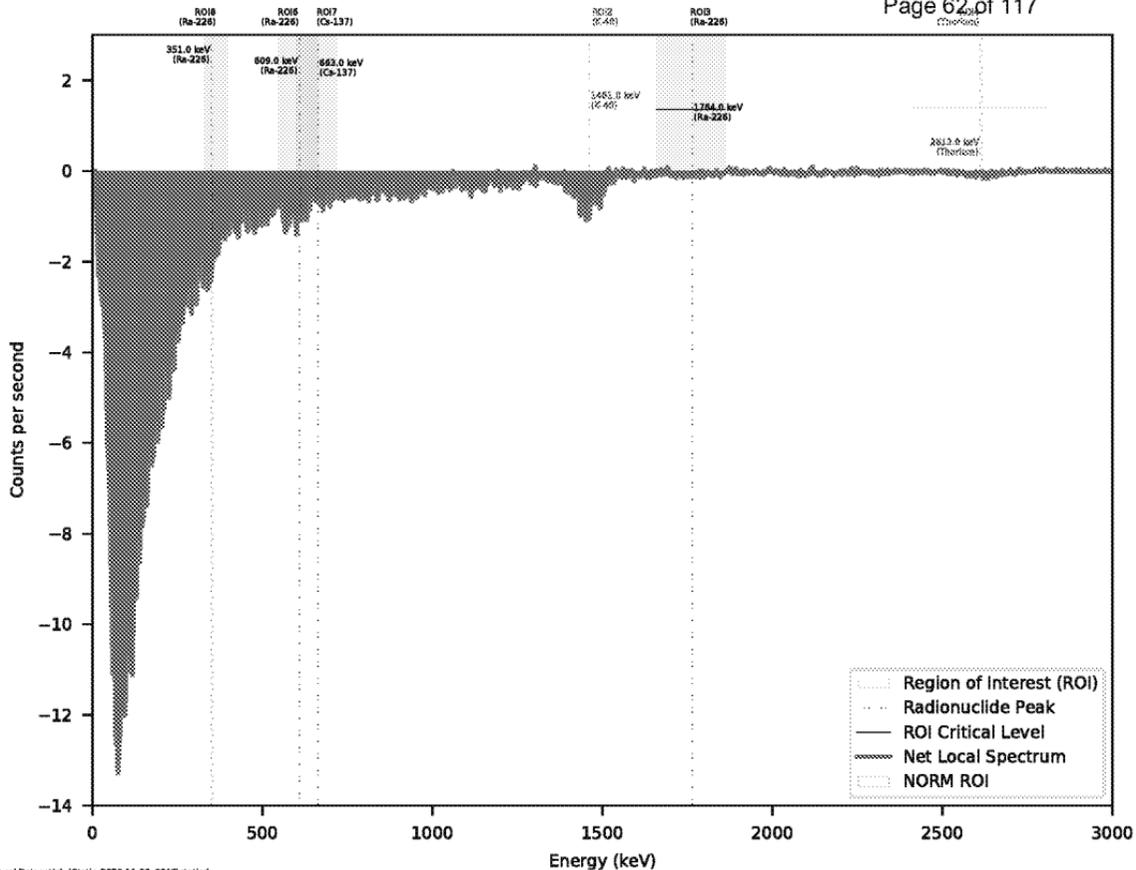


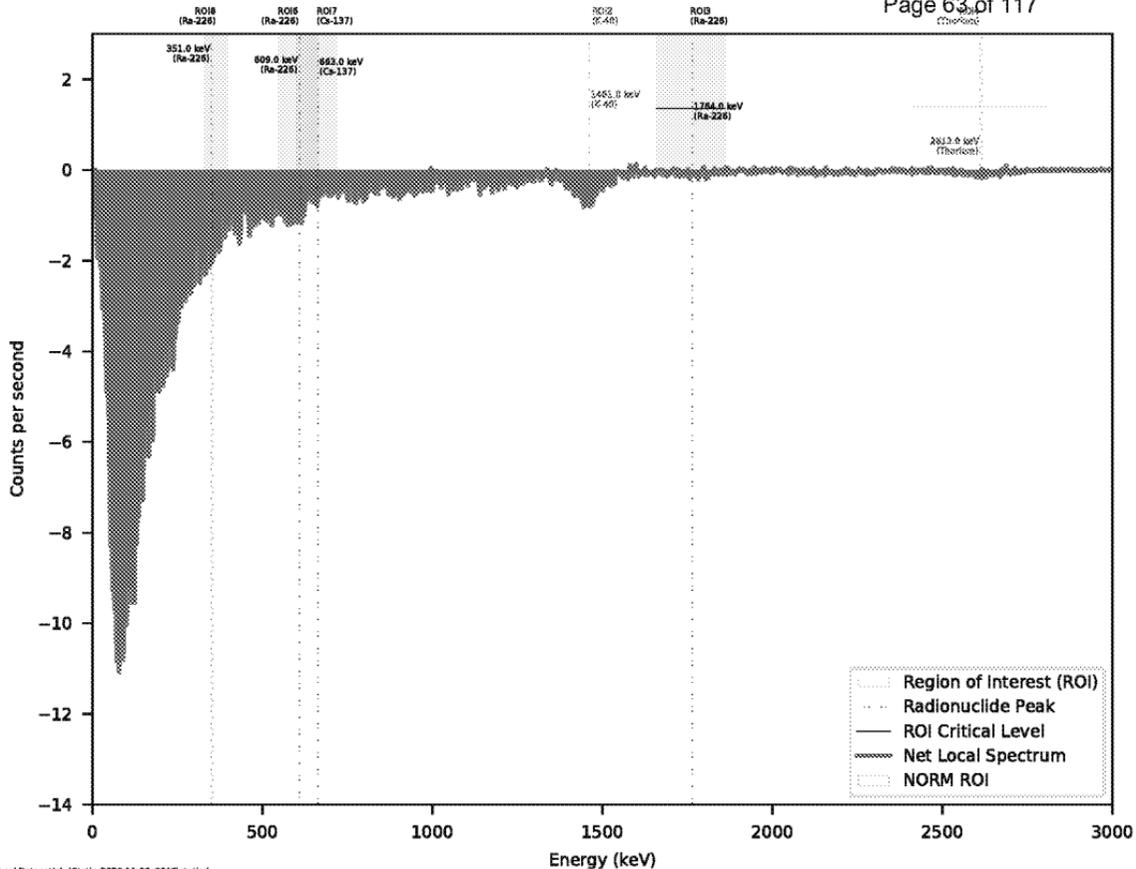


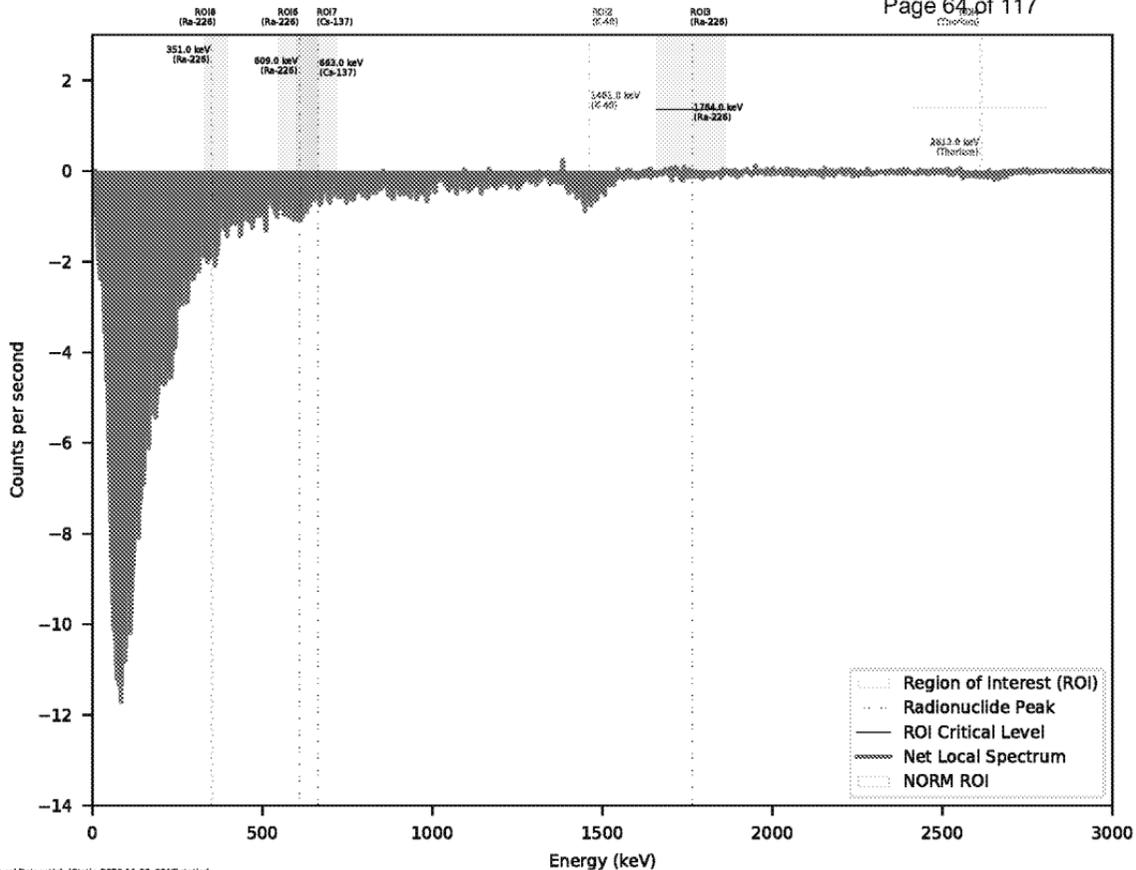


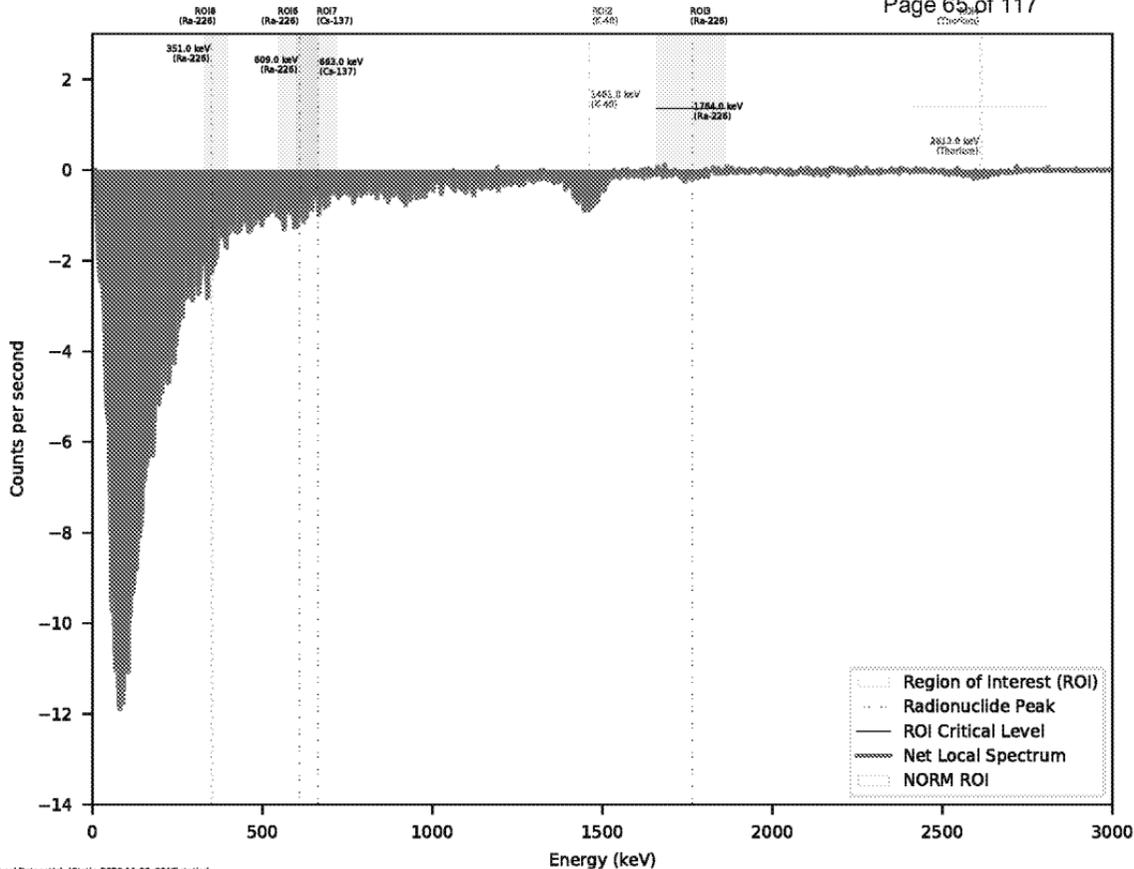


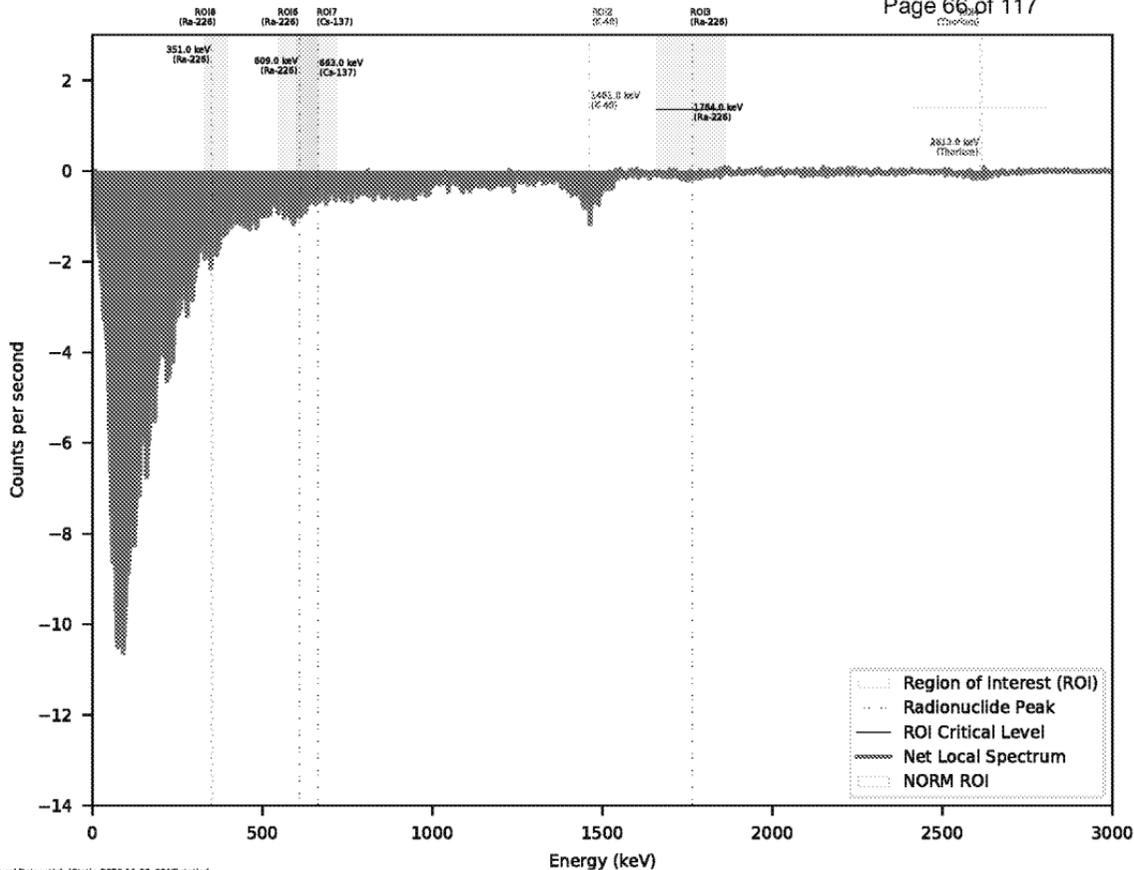














Environment Testing  
America

## ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40340-1  
Laboratory Sample Delivery Group: GJ46599773  
Client Project/Site: HPNS-Parcel G 501197  
Revision: 1

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

Authorized for release by:  
4/9/2021 4:34:58 PM

Rhonda Ridenhower, Client Service Manager  
(314)298-8566  
Rhonda.Ridenhower@Eurofinset.com

### LINKS

Review your project  
results through  
**Total Access**

Have a Question?

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The  
Expert**

Visit us at:

[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
SDG: GJ46599773

**Job ID: 160-40340-1**

**Laboratory: Eurofins TestAmerica, St. Louis**

**Narrative**

## CASE NARRATIVE

**Client: Aptim Federal Services LLC**

**Project: HPNS-Parcel G 501197**

**Report Number: 160-40340-1**

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
SDG: GJ46599773

## Job ID: 160-40340-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

#### RECEIPT

The samples were received on 11/11/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 12.2 C.

#### STRONTIUM-90 (GFPC)

Samples HPPG-ESU-TU099A-001 (160-40340-1), HPPG-ESU-TU099A-011 (160-40340-11), HPPG-ESU-TU099A-021 (160-40340-21) and HPPG-F-029 (160-40340-26) were analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/13/2020, prepared on 12/16/2020 and analyzed on 01/04/2021.

Strontium-90 prep batch 492111

The method blank (MB) z-score associated with Prep Batch 160-492111 is within limits and is stored in the level IV raw data. (MB 160-492111/22-A)

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU099A-001 (160-40340-1), HPPG-ESU-TU099A-011 (160-40340-11), HPPG-ESU-TU099A-021 (160-40340-21) and HPPG-F-029 (160-40340-26).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-ESU-TU099A-001 (160-40340-1), HPPG-ESU-TU099A-002 (160-40340-2), HPPG-ESU-TU099A-003 (160-40340-3), HPPG-ESU-TU099A-004 (160-40340-4), HPPG-ESU-TU099A-005 (160-40340-5), HPPG-ESU-TU099A-006 (160-40340-6), HPPG-ESU-TU099A-007 (160-40340-7), HPPG-ESU-TU099A-008 (160-40340-8), HPPG-ESU-TU099A-009 (160-40340-9), HPPG-ESU-TU099A-010 (160-40340-10), HPPG-ESU-TU099A-011 (160-40340-11), HPPG-ESU-TU099A-012 (160-40340-12), HPPG-ESU-TU099A-013 (160-40340-13), HPPG-ESU-TU099A-014 (160-40340-14), HPPG-ESU-TU099A-015 (160-40340-15), HPPG-ESU-TU099A-016 (160-40340-16), HPPG-ESU-TU099A-017 (160-40340-17), HPPG-ESU-TU099A-018 (160-40340-18), HPPG-ESU-TU099A-019 (160-40340-19), HPPG-ESU-TU099A-020 (160-40340-20), HPPG-ESU-TU099A-021 (160-40340-21), HPPG-ESU-TU099A-022 (160-40340-22), HPPG-ESU-TU099A-023 (160-40340-23), HPPG-ESU-TU099A-024 (160-40340-24), HPPG-ESU-TU099A-025 (160-40340-25), HPPG-F-029 (160-40340-26) and HPPG-F-030 (160-40340-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 11/13/2020, prepared on 11/20/2020 and analyzed on 12/11/2020 and 12/14/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227

# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
SDG: GJ46599773

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## Job ID: 160-40340-1 (Continued)

---

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

#### Gamma prep batch 489844

The MB z-score for Th-234/U-238 associated with Prep Batch 160-489844 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-489844/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-ESU-TU099A-002 (160-40340-2)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Th-234: (MB 160-489844/1-A). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

#### Gamma prep batch 489851

The method blank (MB) z-score associated with Prep Batch 160-489851 is within limits and is stored in the level IV raw data. (MB 160-489851/1-A)

The following samples exhibited a negative result greater in magnitude than the 3 sigma TPU (160-40340-14; Th-234 and 160-40340-23; U-235): HPPG-ESU-TU099A-014 (160-40340-14) and HPPG-ESU-TU099A-023 (160-40340-23)  
This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

#### Gamma prep batch 489908

The MB z-score for Bi-214/Ra-226 associated with Prep Batch 160-489908 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-489908/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



# CHAIN OF CUSTODY

Ref. Document # 501197RSY-026

APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Berck  
Phone #: (619)213-3389

Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy

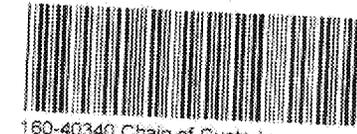
Sample Lead: Lewis, Devin

Sample Tech(s): Paul LeBlanc

Project Number: 501197  
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action  
Project Location: San Francisco, CA  
Purchase Order #: 1159058  
Shipment/Pickup Date: 11/10/2020  
Waybill Number: 4957 0225 5965  
Lab Destination: Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Riderbower (314)298-8566

		Analysis Requested										Dose Rate uR/Hr	Evidence Bag ID	Comment
Matrix	# of Containers	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)											
		Preservatives (water)												
		Preservatives (soil)												
		Container Type												
		16 oz. plastic jar	X				X					4	GJ46599773	
		16 oz. plastic jar	X									4	GJ46599773	
		16 oz. plastic jar	X									4	GJ46599773	
		16 oz. plastic jar	X									4	GJ46599773	
		16 oz. plastic jar	X									4	GJ46599773	
		16 oz. plastic jar	X									4	GJ46599773	
		16 oz. plastic jar	X									4	GJ46599773	
		16 oz. plastic jar	X									4	GJ46599773	



**Special Instructions:** 21 day ingrowth results only  
Analyze for Total Strontium as a screening step, and Isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turanaround Time: 3-day  10-Day  28-day  Other

Level of QC Required: I  II  III  Project Specific

Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil, GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		11/06/2020 16:22	Locked Storage (RKillpack)		11/06/2020 16:22
Locked Storage (RKillpack)		11/10/2020 13:05	Andrew Murri		11/10/2020 13:05
Andrew Murri		11/10/2020 13:11	SHIPPED TO LAB via FedEx		11/11/2020 09:05

\*\*\* Last 3 transfers shown above - Complete list of transfers on last page \*\*\*





# CHAIN OF CUSTODY

Ref. Document # 501197RSY-026

APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Bercik  
Phone #: (619)213-3389

Send Report to: Rose Condit  
Phone/Fax Number: 415-967-0760  
Address: 4005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Paul LeBlanc

Project Number: 501197  
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action  
Project Location: San Francisco, CA  
Purchase Order #: 1159058  
Shipment/Pickup Date: 11/10/2020  
Waybill Number: 4957 0225 5965  
Lab Destination: Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8560

Sample ID	Collection information			Matrix	# of Containers	Container Type	Analysis Requested					Dose Rate uR/Hr	Evidence Bag ID	Comment	
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)							
HPPG-ESU-TU099A-009	11/6/2020	15:05	G	SO	1	16 oz. plastic jar	X					4	GJ46599773		
HPPG-ESU-TU099A-010	11/6/2020	15:09	G	SO	1	16 oz. plastic jar	X					4	GJ46599773		
HPPG-ESU-TU099A-011	11/6/2020	15:12	G	SO	1	16 oz. plastic jar	X	X				4	GJ46599773		
HPPG-ESU-TU099A-012	11/6/2020	15:16	G	SO	1	16 oz. plastic jar	X					4	GJ46599773		
HPPG-ESU-TU099A-013	11/6/2020	15:20	G	SO	1	16 oz. plastic jar	X					4	GJ46599773		
HPPG-ESU-TU099A-014	11/6/2020	15:24	G	SO	1	16 oz. plastic jar	X					4	GJ46599773		
HPPG-ESU-TU099A-015	11/6/2020	15:27	G	SO	1	16 oz. plastic jar	X					4	GJ46599773		
HPPG-ESU-TU099A-016	11/6/2020	15:30	G	SO	1	16 oz. plastic jar	X					4	GJ46599773		
HPPG-ESU-TU099A-017	11/6/2020	15:32	G	SO	1	16 oz. plastic jar	X					4	GJ46599773		
HPPG-ESU-TU099A-018	11/6/2020	15:34	G	SO	1	16 oz. plastic jar	X					4	GJ46599773		
HPPG-ESU-TU099A-019	11/6/2020	15:35	G	SO	1	16 oz. plastic jar	X					4	GJ46599773		
HPPG-ESU-TU099A-020	11/6/2020	15:36	G	SO	1	16 oz. plastic jar	X					4	GJ46599773		
HPPG-ESU-TU099A-021	11/6/2020	15:39	G	SO	1	16 oz. plastic jar	X	X				4	GJ46599773		
HPPG-ESU-TU099A-022	11/6/2020	15:36	G	SO	1	16 oz. plastic jar	X					4	GJ46599773		
HPPG-ESU-TU099A-023	11/6/2020	15:40	G	SO	1	16 oz. plastic jar	X					4	GJ46599773		
HPPG-ESU-TU099A-024	11/6/2020	15:41	G	SO	1	16 oz. plastic jar	X					4	GJ46599773		
HPPG-ESU-TU099A-025	11/6/2020	15:43	G	SO	1	16 oz. plastic jar	X					4	GJ46599773		





# CHAIN OF CUSTODY

Ref. Document # 501197RSY-026

APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Bercik  
Phone #: (619)213-3389

Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0760  
Address: 4005 Port Chicago Hwy  
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Paul LeBlanc

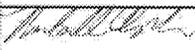
**Project Number:** 501197  
**Project Name:** Hunters Point Naval Shipyard: Parcel G Remedial Action  
**Project Location:** San Francisco, CA  
**Purchase Order #:** 1159058  
**Shipment/Pickup Date:** 11/10/2020  
**Waybill Number:** 44967 0285 6965  
**Lab Destination:** Test America (St. Louis Lab)  
13715 Rider Trail North  
Earth City, MO 63046

**Lab Contact Name/ph #:** Rhoeda Ridenbower (314)298-8568

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested						Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)							
							Preservatives (water)								
							Preservatives (soil)								
HPPG-F-029	11/6/2020	14:34	G	SO	1	16 oz. plastic jar	X	X				4	GJ46599773		
HPPG-F-030	11/6/2020	14:57	G	SO	1	16 oz. plastic jar	X					4	GJ46599773		



# All Transfers for COC 501197RSY-026

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		11/06/2020 16:22	Locked Storage (RKillpack)		11/06/2020 16:22
Locked Storage (RKillpack)		11/10/2020 13:05	Andrew Murri		11/10/2020 13:05
Andrew Murri		11/10/2020 13:11	SHIPPED TO LAB via FedEx	Michael Ninkings	11/11/2020 09:05

## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40340-1

SDG Number: GJ46599773

**Login Number: 40340****List Number: 1****Creator: Korrinhizer, Micha L****List Source: Eurofins TestAmerica, St. Louis**

Question	Answer	Comment
Radioactivity wasn't checked or is <=/ background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
SDG: GJ46599773

## Qualifiers

### Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Method Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
SDG: GJ46599773

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

**Protocol References:**

- DOE = U.S. Department of Energy
- EPA = US Environmental Protection Agency
- None = None

**Laboratory References:**

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

# Sample Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
SDG: GJ46599773

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40340-1	HPPG-ESU-TU099A-001	Solid	11/06/20 14:34	11/11/20 09:05	
160-40340-2	HPPG-ESU-TU099A-002	Solid	11/06/20 14:37	11/11/20 09:05	
160-40340-3	HPPG-ESU-TU099A-003	Solid	11/06/20 14:41	11/11/20 09:05	
160-40340-4	HPPG-ESU-TU099A-004	Solid	11/06/20 14:44	11/11/20 09:05	
160-40340-5	HPPG-ESU-TU099A-005	Solid	11/06/20 14:48	11/11/20 09:05	
160-40340-6	HPPG-ESU-TU099A-006	Solid	11/06/20 14:52	11/11/20 09:05	
160-40340-7	HPPG-ESU-TU099A-007	Solid	11/06/20 14:57	11/11/20 09:05	
160-40340-8	HPPG-ESU-TU099A-008	Solid	11/06/20 15:01	11/11/20 09:05	
160-40340-9	HPPG-ESU-TU099A-009	Solid	11/06/20 15:05	11/11/20 09:05	
160-40340-10	HPPG-ESU-TU099A-010	Solid	11/06/20 15:09	11/11/20 09:05	
160-40340-11	HPPG-ESU-TU099A-011	Solid	11/06/20 15:12	11/11/20 09:05	
160-40340-12	HPPG-ESU-TU099A-012	Solid	11/06/20 15:16	11/11/20 09:05	
160-40340-13	HPPG-ESU-TU099A-013	Solid	11/06/20 15:20	11/11/20 09:05	
160-40340-14	HPPG-ESU-TU099A-014	Solid	11/06/20 15:24	11/11/20 09:05	
160-40340-15	HPPG-ESU-TU099A-015	Solid	11/06/20 15:27	11/11/20 09:05	
160-40340-16	HPPG-ESU-TU099A-016	Solid	11/06/20 15:30	11/11/20 09:05	
160-40340-17	HPPG-ESU-TU099A-017	Solid	11/06/20 15:32	11/11/20 09:05	
160-40340-18	HPPG-ESU-TU099A-018	Solid	11/06/20 15:34	11/11/20 09:05	
160-40340-19	HPPG-ESU-TU099A-019	Solid	11/06/20 15:35	11/11/20 09:05	
160-40340-20	HPPG-ESU-TU099A-020	Solid	11/06/20 15:36	11/11/20 09:05	
160-40340-21	HPPG-ESU-TU099A-021	Solid	11/06/20 15:39	11/11/20 09:05	
160-40340-22	HPPG-ESU-TU099A-022	Solid	11/06/20 15:36	11/11/20 09:05	
160-40340-23	HPPG-ESU-TU099A-023	Solid	11/06/20 15:40	11/11/20 09:05	
160-40340-24	HPPG-ESU-TU099A-024	Solid	11/06/20 15:41	11/11/20 09:05	
160-40340-25	HPPG-ESU-TU099A-025	Solid	11/06/20 15:43	11/11/20 09:05	
160-40340-26	HPPG-F-029	Solid	11/06/20 14:34	11/11/20 09:05	
160-40340-27	HPPG-F-030	Solid	11/06/20 14:57	11/11/20 09:05	

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

**Client Sample ID: HPPG-ESU-TU099A-001**

**Lab Sample ID: 160-40340-1**

Date Collected: 11/06/20 14:34

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Strontium-90	0.0616	U	0.167	0.167	0.160	0.133	pCi/g	12/16/20 14:29	01/04/21 13:53	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	96.4		40 - 110					12/16/20 14:29	01/04/21 13:53	1
Y Carrier	93.1		40 - 110					12/16/20 14:29	01/04/21 13:53	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
<b>Actinium 228</b>	<b>0.137</b>		0.235	0.235		0.125	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Actinium-227	-0.336	U	0.525	0.526		0.376	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Bismuth-212	0.238	U	0.742	0.743		0.587	pCi/g	11/20/20 14:56	12/11/20 10:39	1
<b>Bismuth-214</b>	<b>0.269</b>		0.119	0.123		0.169	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Cesium-137	0.00248	U	0.0660	0.0660	0.0700	0.0542	pCi/g	11/20/20 14:56	12/11/20 10:39	1
<b>Lead-210</b>	<b>1.02</b>		1.36	1.37		0.900	pCi/g	11/20/20 14:56	12/11/20 10:39	1
<b>Lead-212</b>	<b>0.298</b>		0.0800	0.0874		0.0404	pCi/g	11/20/20 14:56	12/11/20 10:39	1
<b>Lead-214</b>	<b>0.306</b>		0.106	0.112		0.0585	pCi/g	11/20/20 14:56	12/11/20 10:39	1
<b>Potassium-40</b>	<b>6.70</b>		1.34	1.55		0.381	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Protactinium-231	-0.901	U	2.56	2.57		2.08	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Protactinium-234	0.0677	U	0.101	0.101		0.262	pCi/g	11/20/20 14:56	12/11/20 10:39	1
<b>Radium-226</b>	<b>0.269</b>		0.119	0.123	0.200	0.169	pCi/g	11/20/20 14:56	12/11/20 10:39	1
<b>Radium-228</b>	<b>0.137</b>		0.235	0.235		0.125	pCi/g	11/20/20 14:56	12/11/20 10:39	1
<b>Thallium-208</b>	<b>0.0942</b>		0.0514	0.0525		0.0495	pCi/g	11/20/20 14:56	12/11/20 10:39	1
<b>Thorium 228</b>	<b>0.298</b>		0.0800	0.0874		0.0404	pCi/g	11/20/20 14:56	12/11/20 10:39	1
<b>Thorium-232</b>	<b>0.137</b>		0.235	0.235		0.125	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Thorium-234	-0.513	U	0.784	0.787		1.07	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Uranium-235	0.0391	U	0.176	0.176		0.482	pCi/g	11/20/20 14:56	12/11/20 10:39	1
Uranium-238	-0.513	U	0.784	0.787		1.07	pCi/g	11/20/20 14:56	12/11/20 10:39	1

**Client Sample ID: HPPG-ESU-TU099A-002**

**Lab Sample ID: 160-40340-2**

Date Collected: 11/06/20 14:37

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
<b>Actinium 228</b>	<b>0.573</b>		0.194	0.202		0.117	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Actinium-227	0.132	U	0.328	0.329		0.293	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Bismuth-212	-0.0435	U	0.932	0.932		0.764	pCi/g	11/20/20 14:56	12/11/20 10:42	1
<b>Bismuth-214</b>	<b>0.588</b>		0.146	0.158		0.0403	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Cesium-137	-0.0542	U	0.0954	0.0955	0.0700	0.0745	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Lead-210	0.779	U	1.44	1.45		0.968	pCi/g	11/20/20 14:56	12/11/20 10:42	1
<b>Lead-212</b>	<b>0.331</b>		0.0864	0.0931		0.0453	pCi/g	11/20/20 14:56	12/11/20 10:42	1
<b>Lead-214</b>	<b>0.411</b>		0.114	0.121		0.0448	pCi/g	11/20/20 14:56	12/11/20 10:42	1
<b>Potassium-40</b>	<b>5.70</b>		1.46	1.57		0.433	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Protactinium-231	-0.867	U	2.99	2.99		2.43	pCi/g	11/20/20 14:56	12/11/20 10:42	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

**Client Sample ID: HPPG-ESU-TU099A-002**

**Lab Sample ID: 160-40340-2**

Date Collected: 11/06/20 14:37

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.109	U	0.249	0.249		0.148	pCi/g	11/20/20 14:56	12/11/20 10:42	1
<b>Radium-226</b>	<b>0.588</b>		0.146	0.158	0.200	0.0403	pCi/g	11/20/20 14:56	12/11/20 10:42	1
<b>Radium-228</b>	<b>0.573</b>		0.194	0.202		0.117	pCi/g	11/20/20 14:56	12/11/20 10:42	1
<b>Thallium-208</b>	<b>0.150</b>		0.0816	0.0830		0.0373	pCi/g	11/20/20 14:56	12/11/20 10:42	1
<b>Thorium 228</b>	<b>0.331</b>		0.0864	0.0931		0.0453	pCi/g	11/20/20 14:56	12/11/20 10:42	1
<b>Thorium-232</b>	<b>0.573</b>		0.194	0.202		0.117	pCi/g	11/20/20 14:56	12/11/20 10:42	1
<b>Thorium-234</b>	<b>0.515</b>		0.500	0.503		0.377	pCi/g	11/20/20 14:56	12/11/20 10:42	1
Uranium-235	-0.200	U	0.402	0.402		0.432	pCi/g	11/20/20 14:56	12/11/20 10:42	1
<b>Uranium-238</b>	<b>0.515</b>		0.500	0.503		0.377	pCi/g	11/20/20 14:56	12/11/20 10:42	1

**Client Sample ID: HPPG-ESU-TU099A-003**

**Lab Sample ID: 160-40340-3**

Date Collected: 11/06/20 14:41

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.251</b>		0.106	0.109		0.122	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Actinium-227	-0.0739	U	0.537	0.537		0.330	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Bismuth-212	-0.00426	U	0.533	0.533		0.459	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Bismuth-214	0.0203	U	0.0402	0.0402		0.157	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Cesium-137	0.0180	U	0.0773	0.0773	0.0700	0.0618	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Lead-210	0.584	U	1.19	1.19		0.820	pCi/g	11/20/20 14:56	12/11/20 10:40	1
<b>Lead-212</b>	<b>0.253</b>		0.0757	0.0824		0.0358	pCi/g	11/20/20 14:56	12/11/20 10:40	1
<b>Lead-214</b>	<b>0.235</b>		0.104	0.107		0.0700	pCi/g	11/20/20 14:56	12/11/20 10:40	1
<b>Potassium-40</b>	<b>6.52</b>		1.39	1.54		0.272	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Protactinium-231	0.252	U	1.27	1.27		1.98	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Protactinium-234	-0.0789	U	0.204	0.204		0.164	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Radium-226	0.0203	U	0.0402	0.0402	0.200	0.157	pCi/g	11/20/20 14:56	12/11/20 10:40	1
<b>Radium-228</b>	<b>0.251</b>		0.106	0.109		0.122	pCi/g	11/20/20 14:56	12/11/20 10:40	1
<b>Thallium-208</b>	<b>0.163</b>		0.0665	0.0686		0.0245	pCi/g	11/20/20 14:56	12/11/20 10:40	1
<b>Thorium 228</b>	<b>0.253</b>		0.0757	0.0824		0.0358	pCi/g	11/20/20 14:56	12/11/20 10:40	1
<b>Thorium-232</b>	<b>0.251</b>		0.106	0.109		0.122	pCi/g	11/20/20 14:56	12/11/20 10:40	1
<b>Thorium-234</b>	<b>0.460</b>		0.425	0.428		0.347	pCi/g	11/20/20 14:56	12/11/20 10:40	1
Uranium-235	-0.154	U	0.251	0.252		0.283	pCi/g	11/20/20 14:56	12/11/20 10:40	1
<b>Uranium-238</b>	<b>0.460</b>		0.425	0.428		0.347	pCi/g	11/20/20 14:56	12/11/20 10:40	1

**Client Sample ID: HPPG-ESU-TU099A-004**

**Lab Sample ID: 160-40340-4**

Date Collected: 11/06/20 14:44

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.345</b>		0.204	0.207		0.0890	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Actinium-227	0.0809	U	0.141	0.142		0.294	pCi/g	11/20/20 14:56	12/11/20 12:37	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

**Client Sample ID: HPPG-ESU-TU099A-004**

**Lab Sample ID: 160-40340-4**

Date Collected: 11/06/20 14:44

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-212	-0.444	U	0.506	0.508		0.771	pCi/g	11/20/20 14:56	12/11/20 12:37	1
<b>Bismuth-214</b>	<b>0.472</b>		0.111	0.121		0.0417	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Cesium-137	0.0200	U	0.0411	0.0411	0.0700	0.0317	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Lead-210	0.574	U	1.27	1.27		1.02	pCi/g	11/20/20 14:56	12/11/20 12:37	1
<b>Lead-212</b>	<b>0.371</b>		0.0738	0.0881		0.0342	pCi/g	11/20/20 14:56	12/11/20 12:37	1
<b>Lead-214</b>	<b>0.379</b>		0.0968	0.105		0.0545	pCi/g	11/20/20 14:56	12/11/20 12:37	1
<b>Potassium-40</b>	<b>8.77</b>		1.21	1.51		0.257	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Protactinium-231	0.000	U	0.469	0.469		1.80	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Protactinium-234	0.0736	U	0.166	0.166		0.184	pCi/g	11/20/20 14:56	12/11/20 12:37	1
<b>Radium-226</b>	<b>0.472</b>		0.111	0.121	0.200	0.0417	pCi/g	11/20/20 14:56	12/11/20 12:37	1
<b>Radium-228</b>	<b>0.345</b>		0.204	0.207		0.0890	pCi/g	11/20/20 14:56	12/11/20 12:37	1
<b>Thallium-208</b>	<b>0.128</b>		0.0404	0.0425		0.0145	pCi/g	11/20/20 14:56	12/11/20 12:37	1
<b>Thorium 228</b>	<b>0.371</b>		0.0738	0.0881		0.0342	pCi/g	11/20/20 14:56	12/11/20 12:37	1
<b>Thorium-232</b>	<b>0.345</b>		0.204	0.207		0.0890	pCi/g	11/20/20 14:56	12/11/20 12:37	1
<b>Thorium-234</b>	<b>0.501</b>		0.344	0.348		0.244	pCi/g	11/20/20 14:56	12/11/20 12:37	1
Uranium-235	0.0135	U	0.145	0.145		0.327	pCi/g	11/20/20 14:56	12/11/20 12:37	1
<b>Uranium-238</b>	<b>0.501</b>		0.344	0.348		0.244	pCi/g	11/20/20 14:56	12/11/20 12:37	1

**Client Sample ID: HPPG-ESU-TU099A-005**

**Lab Sample ID: 160-40340-5**

Date Collected: 11/06/20 14:48

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.357</b>		0.124	0.129		0.0237	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Actinium-227	0.0530	U	0.300	0.300		0.262	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Bismuth-212	0.338	U	0.568	0.569		0.434	pCi/g	11/20/20 15:32	12/14/20 05:56	1
<b>Bismuth-214</b>	<b>0.314</b>		0.0861	0.0921		0.0226	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Cesium-137	-0.00182	U	0.0429	0.0429	0.0700	0.0352	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Lead-210	0.594	U	0.992	0.995		0.697	pCi/g	11/20/20 15:32	12/14/20 05:56	1
<b>Lead-212</b>	<b>0.321</b>		0.0910	0.100		0.0434	pCi/g	11/20/20 15:32	12/14/20 05:56	1
<b>Lead-214</b>	<b>0.413</b>		0.0957	0.105		0.0323	pCi/g	11/20/20 15:32	12/14/20 05:56	1
<b>Potassium-40</b>	<b>7.27</b>		1.12	1.35		0.257	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Protactinium-231	0.0000000	U	2.20	2.20		1.81	pCi/g	11/20/20 15:32	12/14/20 05:56	1
	439									
Protactinium-234	0.0127	U	0.0186	0.0186		0.150	pCi/g	11/20/20 15:32	12/14/20 05:56	1
<b>Radium-226</b>	<b>0.314</b>		0.0861	0.0921	0.200	0.0226	pCi/g	11/20/20 15:32	12/14/20 05:56	1
<b>Radium-228</b>	<b>0.357</b>		0.124	0.129		0.0237	pCi/g	11/20/20 15:32	12/14/20 05:56	1
<b>Thallium-208</b>	<b>0.102</b>		0.0408	0.0422		0.0178	pCi/g	11/20/20 15:32	12/14/20 05:56	1
<b>Thorium 228</b>	<b>0.321</b>		0.0910	0.100		0.0434	pCi/g	11/20/20 15:32	12/14/20 05:56	1
<b>Thorium-232</b>	<b>0.357</b>		0.124	0.129		0.0237	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Thorium-234	-0.100	U	0.713	0.713		0.589	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Uranium-235	-0.00492	U	0.0147	0.0147		0.242	pCi/g	11/20/20 15:32	12/14/20 05:56	1
Uranium-238	-0.100	U	0.713	0.713		0.589	pCi/g	11/20/20 15:32	12/14/20 05:56	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

**Client Sample ID: HPPG-ESU-TU099A-006**

**Lab Sample ID: 160-40340-6**

Date Collected: 11/06/20 14:52

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.256</b>		0.202	0.204		0.110	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Actinium-227	0.0828	U	0.380	0.380		0.361	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Bismuth-212	-0.330	U	0.982	0.983		0.782	pCi/g	11/20/20 15:32	12/11/20 22:04	1
<b>Bismuth-214</b>	<b>0.319</b>		0.134	0.139		0.0536	pCi/g	11/20/20 15:32	12/11/20 22:04	1
<b>Cesium-137</b>	<b>0.0765</b>		0.0458	0.0466	0.0700	0.0243	pCi/g	11/20/20 15:32	12/11/20 22:04	1
<b>Lead-210</b>	<b>1.43</b>		1.50	1.51		0.984	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Lead-212	0.0312	U	0.134	0.134		0.109	pCi/g	11/20/20 15:32	12/11/20 22:04	1
<b>Lead-214</b>	<b>0.420</b>		0.122	0.132		0.0621	pCi/g	11/20/20 15:32	12/11/20 22:04	1
<b>Potassium-40</b>	<b>7.83</b>		1.40	1.66		0.306	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Protactinium-231	-0.0000000	U	2.79	2.79		2.30	pCi/g	11/20/20 15:32	12/11/20 22:04	1
	153									
Protactinium-234	-0.110	U	0.327	0.327		0.266	pCi/g	11/20/20 15:32	12/11/20 22:04	1
<b>Radium-226</b>	<b>0.319</b>		0.134	0.139	0.200	0.0536	pCi/g	11/20/20 15:32	12/11/20 22:04	1
<b>Radium-228</b>	<b>0.256</b>		0.202	0.204		0.110	pCi/g	11/20/20 15:32	12/11/20 22:04	1
<b>Thallium-208</b>	<b>0.129</b>		0.0715	0.0730		0.0304	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Thorium 228	0.0312	U	0.134	0.134		0.109	pCi/g	11/20/20 15:32	12/11/20 22:04	1
<b>Thorium-232</b>	<b>0.256</b>		0.202	0.204		0.110	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Thorium-234	-0.230	U	1.06	1.06		0.877	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Uranium-235	-0.225	U	0.562	0.562		0.479	pCi/g	11/20/20 15:32	12/11/20 22:04	1
Uranium-238	-0.230	U	1.06	1.06		0.877	pCi/g	11/20/20 15:32	12/11/20 22:04	1

**Client Sample ID: HPPG-ESU-TU099A-007**

**Lab Sample ID: 160-40340-7**

Date Collected: 11/06/20 14:57

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.341</b>		0.145	0.149		0.0361	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Actinium-227	-0.0343	U	0.469	0.469		0.290	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Bismuth-212	-0.345	U	0.831	0.831		0.650	pCi/g	11/20/20 15:32	12/11/20 22:10	1
<b>Bismuth-214</b>	<b>0.438</b>		0.145	0.152		0.0562	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Cesium-137	0.0160	U	0.0531	0.0532	0.0700	0.0417	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Lead-210	-0.627	U	1.72	1.72		1.43	pCi/g	11/20/20 15:32	12/11/20 22:10	1
<b>Lead-212</b>	<b>0.274</b>		0.0753	0.0805		0.0385	pCi/g	11/20/20 15:32	12/11/20 22:10	1
<b>Lead-214</b>	<b>0.394</b>		0.111	0.118		0.0416	pCi/g	11/20/20 15:32	12/11/20 22:10	1
<b>Potassium-40</b>	<b>5.45</b>		1.21	1.33		0.219	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Protactinium-231	-0.816	U	3.06	3.06		2.49	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Protactinium-234	0.0719	U	0.233	0.233		0.189	pCi/g	11/20/20 15:32	12/11/20 22:10	1
<b>Radium-226</b>	<b>0.438</b>		0.145	0.152	0.200	0.0562	pCi/g	11/20/20 15:32	12/11/20 22:10	1
<b>Radium-228</b>	<b>0.341</b>		0.145	0.149		0.0361	pCi/g	11/20/20 15:32	12/11/20 22:10	1
<b>Thallium-208</b>	<b>0.146</b>		0.0543	0.0563		0.0158	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Thorium 228	0.274		0.0753	0.0805		0.0385	pCi/g	11/20/20 15:32	12/11/20 22:10	1
<b>Thorium-232</b>	<b>0.341</b>		0.145	0.149		0.0361	pCi/g	11/20/20 15:32	12/11/20 22:10	1
<b>Thorium-234</b>	<b>0.810</b>		0.544	0.552		0.341	pCi/g	11/20/20 15:32	12/11/20 22:10	1
Uranium-235	-0.135	U	0.151	0.151		0.421	pCi/g	11/20/20 15:32	12/11/20 22:10	1
<b>Uranium-238</b>	<b>0.810</b>		0.544	0.552		0.341	pCi/g	11/20/20 15:32	12/11/20 22:10	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

**Client Sample ID: HPPG-ESU-TU099A-008**

**Lab Sample ID: 160-40340-8**

Date Collected: 11/06/20 15:01

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.260</b>		0.153	0.155		0.0612	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Actinium-227	-0.311	U	0.529	0.530		0.375	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Bismuth-212	0.309	U	0.642	0.643		0.500	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Bismuth-214	0.0427	U	0.0725	0.0726		0.172	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Cesium-137	-0.0442	U	0.0775	0.0776	0.0700	0.0611	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Lead-210	0.635	U	1.42	1.42		0.902	pCi/g	11/20/20 15:32	12/11/20 22:12	1
<b>Lead-212</b>	<b>0.366</b>		0.0811	0.0939		0.0411	pCi/g	11/20/20 15:32	12/11/20 22:12	1
<b>Lead-214</b>	<b>0.294</b>		0.0879	0.0930		0.0477	pCi/g	11/20/20 15:32	12/11/20 22:12	1
<b>Potassium-40</b>	<b>8.54</b>		1.25	1.52		0.272	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Protactinium-231	-0.819	U	2.89	2.89		2.35	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Protactinium-234	0.0111	U	0.0181	0.0182		0.157	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Radium-226	0.0427	U	0.0725	0.0726	0.200	0.172	pCi/g	11/20/20 15:32	12/11/20 22:12	1
<b>Radium-228</b>	<b>0.260</b>		0.153	0.155		0.0612	pCi/g	11/20/20 15:32	12/11/20 22:12	1
<b>Thallium-208</b>	<b>0.118</b>		0.0509	0.0523		0.0205	pCi/g	11/20/20 15:32	12/11/20 22:12	1
<b>Thorium 228</b>	<b>0.366</b>		0.0811	0.0939		0.0411	pCi/g	11/20/20 15:32	12/11/20 22:12	1
<b>Thorium-232</b>	<b>0.260</b>		0.153	0.155		0.0612	pCi/g	11/20/20 15:32	12/11/20 22:12	1
<b>Thorium-234</b>	<b>0.579</b>		0.497	0.501		0.311	pCi/g	11/20/20 15:32	12/11/20 22:12	1
Uranium-235	0.000	U	0.0946	0.0946		0.248	pCi/g	11/20/20 15:32	12/11/20 22:12	1
<b>Uranium-238</b>	<b>0.579</b>		0.497	0.501		0.311	pCi/g	11/20/20 15:32	12/11/20 22:12	1

**Client Sample ID: HPPG-ESU-TU099A-009**

**Lab Sample ID: 160-40340-9**

Date Collected: 11/06/20 15:05

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.407</b>		0.153	0.159		0.0382	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Actinium-227	0.0157	U	0.562	0.562		0.349	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Bismuth-212	-0.360	U	1.11	1.11		0.748	pCi/g	11/20/20 15:32	12/11/20 22:11	1
<b>Bismuth-214</b>	<b>0.384</b>		0.148	0.153		0.0747	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Cesium-137	-0.0316	U	0.0905	0.0905	0.0700	0.0558	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Lead-210	-0.344	U	1.23	1.23		0.894	pCi/g	11/20/20 15:32	12/11/20 22:11	1
<b>Lead-212</b>	<b>0.370</b>		0.0869	0.0993		0.0386	pCi/g	11/20/20 15:32	12/11/20 22:11	1
<b>Lead-214</b>	<b>0.297</b>		0.113	0.117		0.0780	pCi/g	11/20/20 15:32	12/11/20 22:11	1
<b>Potassium-40</b>	<b>7.17</b>		1.42	1.60		0.260	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Protactinium-231	0.715	U	2.16	2.16		1.74	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Protactinium-234	-0.0830	U	0.207	0.208		0.167	pCi/g	11/20/20 15:32	12/11/20 22:11	1
<b>Radium-226</b>	<b>0.384</b>		0.148	0.153	0.200	0.0747	pCi/g	11/20/20 15:32	12/11/20 22:11	1
<b>Radium-228</b>	<b>0.407</b>		0.153	0.159		0.0382	pCi/g	11/20/20 15:32	12/11/20 22:11	1
<b>Thallium-208</b>	<b>0.140</b>		0.0624	0.0641		0.0237	pCi/g	11/20/20 15:32	12/11/20 22:11	1
<b>Thorium 228</b>	<b>0.370</b>		0.0869	0.0993		0.0386	pCi/g	11/20/20 15:32	12/11/20 22:11	1
<b>Thorium-232</b>	<b>0.407</b>		0.153	0.159		0.0382	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Thorium-234	-0.588	U	0.616	0.620		0.720	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Uranium-235	0.151	U	0.277	0.277		0.235	pCi/g	11/20/20 15:32	12/11/20 22:11	1
Uranium-238	-0.588	U	0.616	0.620		0.720	pCi/g	11/20/20 15:32	12/11/20 22:11	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

**Client Sample ID: HPPG-ESU-TU099A-010**

**Lab Sample ID: 160-40340-10**

Date Collected: 11/06/20 15:09

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.255</b>		0.109	0.112		0.0273	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Actinium-227	0.239	U	0.469	0.470		0.280	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Bismuth-212	0.356	U	0.719	0.720		0.560	pCi/g	11/20/20 15:32	12/11/20 22:34	1
<b>Bismuth-214</b>	<b>0.339</b>		0.120	0.125		0.0524	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Cesium-137	-0.0464	U	0.0794	0.0796	0.0700	0.0623	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Lead-210	0.376	U	1.25	1.26		0.856	pCi/g	11/20/20 15:32	12/11/20 22:34	1
<b>Lead-212</b>	<b>0.286</b>		0.0757	0.0814		0.0397	pCi/g	11/20/20 15:32	12/11/20 22:34	1
<b>Lead-214</b>	<b>0.334</b>		0.0975	0.103		0.0498	pCi/g	11/20/20 15:32	12/11/20 22:34	1
<b>Potassium-40</b>	<b>7.87</b>		1.20	1.44		0.106	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Protactinium-231	0.554	U	1.65	1.65		1.81	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Protactinium-234	-0.0957	U	0.297	0.298		0.242	pCi/g	11/20/20 15:32	12/11/20 22:34	1
<b>Radium-226</b>	<b>0.339</b>		0.120	0.125	0.200	0.0524	pCi/g	11/20/20 15:32	12/11/20 22:34	1
<b>Radium-228</b>	<b>0.255</b>		0.109	0.112		0.0273	pCi/g	11/20/20 15:32	12/11/20 22:34	1
<b>Thallium-208</b>	<b>0.0912</b>		0.0642	0.0649		0.0316	pCi/g	11/20/20 15:32	12/11/20 22:34	1
<b>Thorium 228</b>	<b>0.286</b>		0.0757	0.0814		0.0397	pCi/g	11/20/20 15:32	12/11/20 22:34	1
<b>Thorium-232</b>	<b>0.255</b>		0.109	0.112		0.0273	pCi/g	11/20/20 15:32	12/11/20 22:34	1
<b>Thorium-234</b>	<b>0.608</b>		0.500	0.504		0.354	pCi/g	11/20/20 15:32	12/11/20 22:34	1
Uranium-235	0.134	U	0.268	0.268		0.425	pCi/g	11/20/20 15:32	12/11/20 22:34	1
<b>Uranium-238</b>	<b>0.608</b>		0.500	0.504		0.354	pCi/g	11/20/20 15:32	12/11/20 22:34	1

**Client Sample ID: HPPG-ESU-TU099A-011**

**Lab Sample ID: 160-40340-11**

Date Collected: 11/06/20 15:12

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Strontium-90</b>	<b>0.199</b>		0.145	0.146	0.160	0.103	pCi/g	12/16/20 14:29	01/04/21 13:53	1
<i>Carrier</i>	<i>%Yield</i>	<i>Qualifier</i>	<i>Limits</i>				<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>	
<i>Sr Carrier</i>	98.8		40 - 110				12/16/20 14:29	01/04/21 13:53	1	
<i>Y Carrier</i>	91.2		40 - 110				12/16/20 14:29	01/04/21 13:53	1	

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.380</b>		0.105	0.112		0.0427	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Actinium-227	0.165	U	0.257	0.258		0.219	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Bismuth-212	0.242	U	0.478	0.478		0.370	pCi/g	11/20/20 15:32	12/11/20 22:35	1
<b>Bismuth-214</b>	<b>0.331</b>		0.103	0.109		0.0449	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Cesium-137	0.0126	U	0.0277	0.0277	0.0700	0.0210	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Lead-210	-0.162	U	1.17	1.17		0.955	pCi/g	11/20/20 15:32	12/11/20 22:35	1
<b>Lead-212</b>	<b>0.330</b>		0.0690	0.0811		0.0354	pCi/g	11/20/20 15:32	12/11/20 22:35	1
<b>Lead-214</b>	<b>0.292</b>		0.0771	0.0829		0.0424	pCi/g	11/20/20 15:32	12/11/20 22:35	1
<b>Potassium-40</b>	<b>8.38</b>		1.07	1.37		0.0794	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Protactinium-231	-0.695	U	2.14	2.14		1.74	pCi/g	11/20/20 15:32	12/11/20 22:35	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

**Client Sample ID: HPPG-ESU-TU099A-011**

**Lab Sample ID: 160-40340-11**

Date Collected: 11/06/20 15:12

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.0354	U	0.0676	0.0677		0.185	pCi/g	11/20/20 15:32	12/11/20 22:35	1
<b>Radium-226</b>	<b>0.331</b>		0.103	0.109	0.200	0.0449	pCi/g	11/20/20 15:32	12/11/20 22:35	1
<b>Radium-228</b>	<b>0.380</b>		0.105	0.112		0.0427	pCi/g	11/20/20 15:32	12/11/20 22:35	1
<b>Thallium-208</b>	<b>0.130</b>		0.0395	0.0418		0.0102	pCi/g	11/20/20 15:32	12/11/20 22:35	1
<b>Thorium 228</b>	<b>0.330</b>		0.0690	0.0811		0.0354	pCi/g	11/20/20 15:32	12/11/20 22:35	1
<b>Thorium-232</b>	<b>0.380</b>		0.105	0.112		0.0427	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Thorium-234	0.122	U	0.659	0.659		0.850	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Uranium-235	0.181	U	0.312	0.312		0.298	pCi/g	11/20/20 15:32	12/11/20 22:35	1
Uranium-238	0.122	U	0.659	0.659		0.850	pCi/g	11/20/20 15:32	12/11/20 22:35	1

**Client Sample ID: HPPG-ESU-TU099A-012**

**Lab Sample ID: 160-40340-12**

Date Collected: 11/06/20 15:16

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.351</b>		0.123	0.128		0.0445	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Actinium-227	0.112	U	0.412	0.412		0.250	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Bismuth-212	-0.430	U	0.716	0.717		0.554	pCi/g	11/20/20 15:32	12/11/20 22:38	1
<b>Bismuth-214</b>	<b>0.249</b>		0.0983	0.102		0.0487	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Cesium-137	0.0243	U	0.0477	0.0478	0.0700	0.0368	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Lead-210	0.0115	U	1.26	1.26		1.03	pCi/g	11/20/20 15:32	12/11/20 22:38	1
<b>Lead-212</b>	<b>0.215</b>		0.0714	0.0767		0.0428	pCi/g	11/20/20 15:32	12/11/20 22:38	1
<b>Lead-214</b>	<b>0.247</b>		0.0982	0.102		0.0540	pCi/g	11/20/20 15:32	12/11/20 22:38	1
<b>Potassium-40</b>	<b>6.52</b>		1.09	1.27		0.232	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Protactinium-231	0.315	U	1.22	1.23		1.92	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Protactinium-234	-0.0906	U	0.0677	0.0684		0.233	pCi/g	11/20/20 15:32	12/11/20 22:38	1
<b>Radium-226</b>	<b>0.249</b>		0.0983	0.102	0.200	0.0487	pCi/g	11/20/20 15:32	12/11/20 22:38	1
<b>Radium-228</b>	<b>0.351</b>		0.123	0.128		0.0445	pCi/g	11/20/20 15:32	12/11/20 22:38	1
<b>Thallium-208</b>	<b>0.138</b>		0.0480	0.0501		0.0180	pCi/g	11/20/20 15:32	12/11/20 22:38	1
<b>Thorium 228</b>	<b>0.215</b>		0.0714	0.0767		0.0428	pCi/g	11/20/20 15:32	12/11/20 22:38	1
<b>Thorium-232</b>	<b>0.351</b>		0.123	0.128		0.0445	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Thorium-234	-0.599	U	0.853	0.856		0.718	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Uranium-235	-0.161	U	0.552	0.552		0.451	pCi/g	11/20/20 15:32	12/11/20 22:38	1
Uranium-238	-0.599	U	0.853	0.856		0.718	pCi/g	11/20/20 15:32	12/11/20 22:38	1

**Client Sample ID: HPPG-ESU-TU099A-013**

**Lab Sample ID: 160-40340-13**

Date Collected: 11/06/20 15:20

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.654</b>		0.197	0.211		0.0346	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Actinium-227	-0.424	U	0.659	0.661		0.476	pCi/g	11/20/20 15:32	12/11/20 22:39	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

**Client Sample ID: HPPG-ESU-TU099A-013**

**Lab Sample ID: 160-40340-13**

Date Collected: 11/06/20 15:20

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-212	0.252	U	0.826	0.826		0.655	pCi/g	11/20/20 15:32	12/11/20 22:39	1
<b>Bismuth-214</b>	<b>0.414</b>		0.149	0.157		0.0739	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Cesium-137	0.0270	U	0.0645	0.0645	0.0700	0.0503	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Lead-210	-0.900	U	1.94	1.94		1.63	pCi/g	11/20/20 15:32	12/11/20 22:39	1
<b>Lead-212</b>	<b>0.509</b>		0.101	0.117		0.0438	pCi/g	11/20/20 15:32	12/11/20 22:39	1
<b>Lead-214</b>	<b>0.518</b>		0.114	0.129		0.0549	pCi/g	11/20/20 15:32	12/11/20 22:39	1
<b>Potassium-40</b>	<b>7.71</b>		1.39	1.65		0.306	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Protactinium-231	0.391	U	1.23	1.23		1.96	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Protactinium-234	0.0761	U	0.325	0.326		0.266	pCi/g	11/20/20 15:32	12/11/20 22:39	1
<b>Radium-226</b>	<b>0.414</b>		0.149	0.157	0.200	0.0739	pCi/g	11/20/20 15:32	12/11/20 22:39	1
<b>Radium-228</b>	<b>0.654</b>		0.197	0.211		0.0346	pCi/g	11/20/20 15:32	12/11/20 22:39	1
<b>Thallium-208</b>	<b>0.149</b>		0.0808	0.0826		0.0394	pCi/g	11/20/20 15:32	12/11/20 22:39	1
<b>Thorium 228</b>	<b>0.509</b>		0.101	0.117		0.0438	pCi/g	11/20/20 15:32	12/11/20 22:39	1
<b>Thorium-232</b>	<b>0.654</b>		0.197	0.211		0.0346	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Thorium-234	0.235	U	0.595	0.596		0.472	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Uranium-235	0.0895	U	0.191	0.191		0.459	pCi/g	11/20/20 15:32	12/11/20 22:39	1
Uranium-238	0.235	U	0.595	0.596		0.472	pCi/g	11/20/20 15:32	12/11/20 22:39	1

**Client Sample ID: HPPG-ESU-TU099A-014**

**Lab Sample ID: 160-40340-14**

Date Collected: 11/06/20 15:24

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.177</b>		0.205	0.206		0.157	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Actinium-227	0.161	U	0.454	0.454		0.274	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Bismuth-212	0.311	U	0.649	0.649		0.498	pCi/g	11/20/20 15:32	12/11/20 22:45	1
<b>Bismuth-214</b>	<b>0.359</b>		0.122	0.127		0.0463	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Cesium-137	0.0246	U	0.0503	0.0503	0.0700	0.0384	pCi/g	11/20/20 15:32	12/11/20 22:45	1
<b>Lead-210</b>	<b>1.53</b>		1.45	1.46		0.885	pCi/g	11/20/20 15:32	12/11/20 22:45	1
<b>Lead-212</b>	<b>0.336</b>		0.0747	0.0825		0.0346	pCi/g	11/20/20 15:32	12/11/20 22:45	1
<b>Lead-214</b>	<b>0.338</b>		0.0847	0.0914		0.0410	pCi/g	11/20/20 15:32	12/11/20 22:45	1
<b>Potassium-40</b>	<b>8.17</b>		1.63	1.83		0.480	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Protactinium-231	0.000	U	0.680	0.680		1.83	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Protactinium-234	0.130	U	0.254	0.254		0.178	pCi/g	11/20/20 15:32	12/11/20 22:45	1
<b>Radium-226</b>	<b>0.359</b>		0.122	0.127	0.200	0.0463	pCi/g	11/20/20 15:32	12/11/20 22:45	1
<b>Radium-228</b>	<b>0.177</b>		0.205	0.206		0.157	pCi/g	11/20/20 15:32	12/11/20 22:45	1
<b>Thallium-208</b>	<b>0.102</b>		0.0720	0.0727		0.0354	pCi/g	11/20/20 15:32	12/11/20 22:45	1
<b>Thorium 228</b>	<b>0.336</b>		0.0747	0.0825		0.0346	pCi/g	11/20/20 15:32	12/11/20 22:45	1
<b>Thorium-232</b>	<b>0.177</b>		0.205	0.206		0.157	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Thorium-234	-0.876	U	0.558	0.567		0.682	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Uranium-235	0.0681	U	0.195	0.195		0.301	pCi/g	11/20/20 15:32	12/11/20 22:45	1
Uranium-238	-0.876	U	0.558	0.567		0.682	pCi/g	11/20/20 15:32	12/11/20 22:45	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

**Client Sample ID: HPPG-ESU-TU099A-015**

**Lab Sample ID: 160-40340-15**

Date Collected: 11/06/20 15:27

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.346</b>		0.106	0.112		0.0229	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Actinium-227	-0.278	U	0.429	0.430		0.335	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Bismuth-212	-0.0469	U	0.755	0.755		0.614	pCi/g	11/20/20 15:32	12/11/20 22:47	1
<b>Bismuth-214</b>	<b>0.126</b>		0.0726	0.0738		0.0961	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Cesium-137	0.0198	U	0.0437	0.0437	0.0700	0.0339	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Lead-210	0.257	U	1.08	1.08		0.733	pCi/g	11/20/20 15:32	12/11/20 22:47	1
<b>Lead-212</b>	<b>0.224</b>		0.0657	0.0718		0.0369	pCi/g	11/20/20 15:32	12/11/20 22:47	1
<b>Lead-214</b>	<b>0.232</b>		0.0774	0.0810		0.0618	pCi/g	11/20/20 15:32	12/11/20 22:47	1
<b>Potassium-40</b>	<b>6.26</b>		1.03	1.21		0.249	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Protactinium-231	0.529	U	1.84	1.84		1.50	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Protactinium-234	-0.0726	U	0.182	0.182		0.147	pCi/g	11/20/20 15:32	12/11/20 22:47	1
<b>Radium-226</b>	<b>0.126</b>		0.0726	0.0738	0.200	0.0961	pCi/g	11/20/20 15:32	12/11/20 22:47	1
<b>Radium-228</b>	<b>0.346</b>		0.106	0.112		0.0229	pCi/g	11/20/20 15:32	12/11/20 22:47	1
<b>Thallium-208</b>	<b>0.0608</b>		0.0615	0.0618		0.0313	pCi/g	11/20/20 15:32	12/11/20 22:47	1
<b>Thorium 228</b>	<b>0.224</b>		0.0657	0.0718		0.0369	pCi/g	11/20/20 15:32	12/11/20 22:47	1
<b>Thorium-232</b>	<b>0.346</b>		0.106	0.112		0.0229	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Thorium-234	-0.523	U	0.452	0.456		0.421	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Uranium-235	-0.117	U	0.295	0.296		0.239	pCi/g	11/20/20 15:32	12/11/20 22:47	1
Uranium-238	-0.523	U	0.452	0.456		0.421	pCi/g	11/20/20 15:32	12/11/20 22:47	1

**Client Sample ID: HPPG-ESU-TU099A-016**

**Lab Sample ID: 160-40340-16**

Date Collected: 11/06/20 15:30

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.219</b>		0.122	0.124		0.0404	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Actinium-227	0.0992	U	0.422	0.422		0.334	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Bismuth-212	0.0233	U	0.762	0.762		0.624	pCi/g	11/20/20 15:32	12/11/20 22:46	1
<b>Bismuth-214</b>	<b>0.380</b>		0.136	0.142		0.0709	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Cesium-137	0.0114	U	0.0599	0.0599	0.0700	0.0477	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Lead-210	-0.151	U	1.32	1.32		0.945	pCi/g	11/20/20 15:32	12/11/20 22:46	1
<b>Lead-212</b>	<b>0.377</b>		0.0923	0.104		0.0432	pCi/g	11/20/20 15:32	12/11/20 22:46	1
<b>Lead-214</b>	<b>0.399</b>		0.131	0.137		0.0644	pCi/g	11/20/20 15:32	12/11/20 22:46	1
<b>Potassium-40</b>	<b>8.42</b>		1.57	1.80		0.275	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Protactinium-231	0.000	U	0.197	0.197		2.03	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Protactinium-234	-0.0276	U	0.0715	0.0715		0.162	pCi/g	11/20/20 15:32	12/11/20 22:46	1
<b>Radium-226</b>	<b>0.380</b>		0.136	0.142	0.200	0.0709	pCi/g	11/20/20 15:32	12/11/20 22:46	1
<b>Radium-228</b>	<b>0.219</b>		0.122	0.124		0.0404	pCi/g	11/20/20 15:32	12/11/20 22:46	1
<b>Thallium-208</b>	<b>0.107</b>		0.0759	0.0767		0.0310	pCi/g	11/20/20 15:32	12/11/20 22:46	1
<b>Thorium 228</b>	<b>0.377</b>		0.0923	0.104		0.0432	pCi/g	11/20/20 15:32	12/11/20 22:46	1
<b>Thorium-232</b>	<b>0.219</b>		0.122	0.124		0.0404	pCi/g	11/20/20 15:32	12/11/20 22:46	1
<b>Thorium-234</b>	<b>0.680</b>		0.616	0.620		0.367	pCi/g	11/20/20 15:32	12/11/20 22:46	1
Uranium-235	0.145	U	0.271	0.272		0.222	pCi/g	11/20/20 15:32	12/11/20 22:46	1
<b>Uranium-238</b>	<b>0.680</b>		0.616	0.620		0.367	pCi/g	11/20/20 15:32	12/11/20 22:46	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

**Client Sample ID: HPPG-ESU-TU099A-017**

**Lab Sample ID: 160-40340-17**

Date Collected: 11/06/20 15:32

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.403</b>		0.171	0.176		0.0830	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Actinium-227	0.125	U	0.251	0.251		0.284	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Bismuth-212	-0.113	U	1.04	1.04		0.850	pCi/g	11/20/20 15:32	12/11/20 22:41	1
<b>Bismuth-214</b>	<b>0.320</b>		0.138	0.142		0.0622	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Cesium-137	-0.0547	U	0.0860	0.0862	0.0700	0.0668	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Lead-210	-1.66	U	1.16	1.17		1.55	pCi/g	11/20/20 15:32	12/11/20 22:41	1
<b>Lead-212</b>	<b>0.350</b>		0.0895	0.100		0.0474	pCi/g	11/20/20 15:32	12/11/20 22:41	1
<b>Lead-214</b>	<b>0.322</b>		0.125	0.129		0.0595	pCi/g	11/20/20 15:32	12/11/20 22:41	1
<b>Potassium-40</b>	<b>8.08</b>		1.42	1.65		0.256	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Protactinium-231	0.000	U	0.630	0.630		2.15	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Protactinium-234	0.174	U	0.117	0.119		0.235	pCi/g	11/20/20 15:32	12/11/20 22:41	1
<b>Radium-226</b>	<b>0.320</b>		0.138	0.142	0.200	0.0622	pCi/g	11/20/20 15:32	12/11/20 22:41	1
<b>Radium-228</b>	<b>0.403</b>		0.171	0.176		0.0830	pCi/g	11/20/20 15:32	12/11/20 22:41	1
<b>Thallium-208</b>	<b>0.191</b>		0.0635	0.0666		0.0228	pCi/g	11/20/20 15:32	12/11/20 22:41	1
<b>Thorium 228</b>	<b>0.350</b>		0.0895	0.100		0.0474	pCi/g	11/20/20 15:32	12/11/20 22:41	1
<b>Thorium-232</b>	<b>0.403</b>		0.171	0.176		0.0830	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Thorium-234	-0.828	U	0.802	0.808		1.02	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Uranium-235	0.0854	U	0.214	0.214		0.272	pCi/g	11/20/20 15:32	12/11/20 22:41	1
Uranium-238	-0.828	U	0.802	0.808		1.02	pCi/g	11/20/20 15:32	12/11/20 22:41	1

**Client Sample ID: HPPG-ESU-TU099A-018**

**Lab Sample ID: 160-40340-18**

Date Collected: 11/06/20 15:34

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.358</b>		0.172	0.175		0.0676	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Actinium-227	-0.246	U	0.327	0.328		0.316	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Bismuth-212	-0.00287	U	0.562	0.562		0.462	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Bismuth-214</b>	<b>0.465</b>		0.111	0.121		0.0392	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Cesium-137	0.0186	U	0.0365	0.0365	0.0700	0.0279	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Lead-210	0.465	U	1.01	1.02		0.809	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Lead-212</b>	<b>0.354</b>		0.0666	0.0809		0.0276	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Lead-214</b>	<b>0.345</b>		0.0918	0.0985		0.0467	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Potassium-40</b>	<b>7.15</b>		1.06	1.29		0.240	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Protactinium-231	0.000	U	0.369	0.369		1.66	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Protactinium-234	0.151	U	0.0839	0.0853		0.153	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Radium-226</b>	<b>0.465</b>		0.111	0.121	0.200	0.0392	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Radium-228</b>	<b>0.358</b>		0.172	0.175		0.0676	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Thallium-208</b>	<b>0.0936</b>		0.0511	0.0520		0.0211	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Thorium 228</b>	<b>0.354</b>		0.0666	0.0809		0.0276	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Thorium-232</b>	<b>0.358</b>		0.172	0.175		0.0676	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Thorium-234	0.206	U	0.585	0.586		0.507	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Uranium-235	-0.158	U	0.444	0.444		0.362	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Uranium-238	0.206	U	0.585	0.586		0.507	pCi/g	11/20/20 15:32	12/11/20 23:20	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

**Client Sample ID: HPPG-ESU-TU099A-019**

**Lab Sample ID: 160-40340-19**

Date Collected: 11/06/20 15:35

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.314</b>		0.178	0.181		0.0940	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Actinium-227	0.129	U	0.401	0.401		0.318	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Bismuth-212	-0.194	U	0.772	0.772		0.618	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Bismuth-214</b>	<b>0.463</b>		0.148	0.155		0.0629	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Cesium-137	0.0252	U	0.0457	0.0458	0.0700	0.0344	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Lead-210</b>	<b>1.24</b>		1.26	1.27		0.827	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Lead-212</b>	<b>0.347</b>		0.0863	0.0936		0.0449	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Lead-214</b>	<b>0.429</b>		0.105	0.114		0.0487	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Potassium-40</b>	<b>8.11</b>		1.27	1.51		0.115	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Protactinium-231	-0.915	U	3.02	3.03		2.46	pCi/g	11/20/20 15:32	12/11/20 23:20	1
Protactinium-234	0.0274	U	0.282	0.282		0.232	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Radium-226</b>	<b>0.463</b>		0.148	0.155	0.200	0.0629	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Radium-228</b>	<b>0.314</b>		0.178	0.181		0.0940	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Thallium-208</b>	<b>0.197</b>		0.0505	0.0544		0.00737	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Thorium 228</b>	<b>0.347</b>		0.0863	0.0936		0.0449	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Thorium-232</b>	<b>0.314</b>		0.178	0.181		0.0940	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Thorium-234</b>	<b>1.03</b>		0.709	0.718		0.407	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Uranium-235</b>	<b>0.297</b>		0.244	0.246		0.135	pCi/g	11/20/20 15:32	12/11/20 23:20	1
<b>Uranium-238</b>	<b>1.03</b>		0.709	0.718		0.407	pCi/g	11/20/20 15:32	12/11/20 23:20	1

**Client Sample ID: HPPG-ESU-TU099A-020**

**Lab Sample ID: 160-40340-20**

Date Collected: 11/06/20 15:36

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.423</b>		0.179	0.184		0.0677	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Actinium-227	0.162	U	0.365	0.365		0.272	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Bismuth-212	0.291	U	0.469	0.470		0.355	pCi/g	11/20/20 15:32	12/11/20 23:23	1
<b>Bismuth-214</b>	<b>0.292</b>		0.0877	0.0928		0.0377	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Cesium-137	0.0232	U	0.0417	0.0417	0.0700	0.0320	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Lead-210	0.571	U	1.24	1.24		0.994	pCi/g	11/20/20 15:32	12/11/20 23:23	1
<b>Lead-212</b>	<b>0.351</b>		0.0730	0.0859		0.0372	pCi/g	11/20/20 15:32	12/11/20 23:23	1
<b>Lead-214</b>	<b>0.369</b>		0.0861	0.0942		0.0526	pCi/g	11/20/20 15:32	12/11/20 23:23	1
<b>Potassium-40</b>	<b>7.66</b>		1.05	1.31		0.0845	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Protactinium-231	0.000	U	0.507	0.507		1.65	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Protactinium-234	-0.00537	U	0.208	0.208		0.171	pCi/g	11/20/20 15:32	12/11/20 23:23	1
<b>Radium-226</b>	<b>0.292</b>		0.0877	0.0928	0.200	0.0377	pCi/g	11/20/20 15:32	12/11/20 23:23	1
<b>Radium-228</b>	<b>0.423</b>		0.179	0.184		0.0677	pCi/g	11/20/20 15:32	12/11/20 23:23	1
<b>Thallium-208</b>	<b>0.144</b>		0.0360	0.0389		0.00524	pCi/g	11/20/20 15:32	12/11/20 23:23	1
<b>Thorium 228</b>	<b>0.351</b>		0.0730	0.0859		0.0372	pCi/g	11/20/20 15:32	12/11/20 23:23	1
<b>Thorium-232</b>	<b>0.423</b>		0.179	0.184		0.0677	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Thorium-234	0.309	U	0.764	0.765		0.855	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Uranium-235	0.0730	U	0.172	0.172		0.281	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Uranium-238	0.309	U	0.764	0.765		0.855	pCi/g	11/20/20 15:32	12/11/20 23:23	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

**Client Sample ID: HPPG-ESU-TU099A-021**

**Lab Sample ID: 160-40340-21**

Date Collected: 11/06/20 15:39

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Strontium-90	-0.0198	U	0.145	0.145	0.160	0.121	pCi/g	12/16/20 14:29	01/04/21 13:53	1
Carrier	%Yield	Qualifier	Limits							
Sr Carrier	100		40 - 110							
Y Carrier	90.8		40 - 110							
					Prepared	Analyzed		Dil Fac		
					12/16/20 14:29	01/04/21 13:53		1		
					12/16/20 14:29	01/04/21 13:53		1		

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.137	U	0.255	0.255		0.160	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Actinium-227	0.213	U	0.433	0.433		0.295	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Bismuth-212	0.0713	U	0.674	0.674		0.548	pCi/g	11/20/20 15:32	12/11/20 23:23	1
<b>Bismuth-214</b>	<b>0.350</b>		0.104	0.110		0.0403	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Cesium-137	-0.0429	U	0.0660	0.0661	0.0700	0.0504	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Lead-210	-1.46	U	1.41	1.42		1.31	pCi/g	11/20/20 15:32	12/11/20 23:23	1
<b>Lead-212</b>	<b>0.298</b>		0.0966	0.104		0.0473	pCi/g	11/20/20 15:32	12/11/20 23:23	1
<b>Lead-214</b>	<b>0.325</b>		0.125	0.130		0.0798	pCi/g	11/20/20 15:32	12/11/20 23:23	1
<b>Potassium-40</b>	<b>7.94</b>		1.36	1.58		0.237	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Protactinium-231	0.277	U	1.23	1.23		1.91	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Protactinium-234	0.121	U	0.276	0.276		0.178	pCi/g	11/20/20 15:32	12/11/20 23:23	1
<b>Radium-226</b>	<b>0.350</b>		0.104	0.110	0.200	0.0403	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Radium-228	0.137	U	0.255	0.255		0.160	pCi/g	11/20/20 15:32	12/11/20 23:23	1
<b>Thallium-208</b>	<b>0.0931</b>		0.0403	0.0415		0.0148	pCi/g	11/20/20 15:32	12/11/20 23:23	1
<b>Thorium 228</b>	<b>0.298</b>		0.0966	0.104		0.0473	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Thorium-232	0.137	U	0.255	0.255		0.160	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Thorium-234	-0.430	U	0.643	0.645		0.910	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Uranium-235	0.139	U	0.379	0.379		0.350	pCi/g	11/20/20 15:32	12/11/20 23:23	1
Uranium-238	-0.430	U	0.643	0.645		0.910	pCi/g	11/20/20 15:32	12/11/20 23:23	1

**Client Sample ID: HPPG-ESU-TU099A-022**

**Lab Sample ID: 160-40340-22**

Date Collected: 11/06/20 15:36

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.416</b>		0.154	0.160		0.0334	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Actinium-227	0.152	U	0.419	0.420		0.334	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Bismuth-212	0.235	U	0.698	0.698		0.549	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Bismuth-214	0.0422	U	0.137	0.137		0.180	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Cesium-137	0.0324	U	0.0611	0.0612	0.0700	0.0469	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Lead-210</b>	<b>1.07</b>		1.59	1.60		1.04	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Lead-212</b>	<b>0.342</b>		0.109	0.118		0.0681	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Lead-214</b>	<b>0.427</b>		0.135	0.143		0.0696	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Potassium-40</b>	<b>9.21</b>		1.49	1.76		0.310	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Protactinium-231	0.705	U	2.17	2.17		2.37	pCi/g	11/20/20 15:32	12/11/20 23:24	1

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# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

**Client Sample ID: HPPG-ESU-TU099A-022**

**Lab Sample ID: 160-40340-22**

Date Collected: 11/06/20 15:36

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.0356	U	0.0593	0.0594		0.277	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Radium-226	0.0422	U	0.137	0.137	0.200	0.180	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Radium-228</b>	<b>0.416</b>		0.154	0.160		0.0334	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Thallium-208</b>	<b>0.174</b>		0.0601	0.0627		0.0229	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Thorium 228</b>	<b>0.342</b>		0.109	0.118		0.0681	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Thorium-232</b>	<b>0.416</b>		0.154	0.160		0.0334	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Thorium-234	-0.426	U	1.03	1.03		0.858	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Uranium-235	0.109	U	0.229	0.229		0.343	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Uranium-238	-0.426	U	1.03	1.03		0.858	pCi/g	11/20/20 15:32	12/11/20 23:24	1

**Client Sample ID: HPPG-ESU-TU099A-023**

**Lab Sample ID: 160-40340-23**

Date Collected: 11/06/20 15:40

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.459</b>		0.160	0.168		0.0324	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Actinium-227	0.0975	U	0.397	0.397		0.389	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Bismuth-212	-0.249	U	0.924	0.925		0.741	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Bismuth-214</b>	<b>0.332</b>		0.141	0.146		0.0566	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Cesium-137	-0.0448	U	0.0754	0.0756	0.0700	0.0584	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Lead-210	0.525	U	1.37	1.37		0.967	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Lead-212</b>	<b>0.368</b>		0.0919	0.102		0.0486	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Lead-214</b>	<b>0.397</b>		0.120	0.129		0.0542	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Potassium-40</b>	<b>8.25</b>		1.38	1.68		0.286	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Protactinium-231	0.000	U	0.240	0.240		2.33	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Protactinium-234	0.00764	U	0.0137	0.0137		0.272	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Radium-226</b>	<b>0.332</b>		0.141	0.146	0.200	0.0566	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Radium-228</b>	<b>0.459</b>		0.160	0.168		0.0324	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Thallium-208</b>	<b>0.0873</b>		0.0897	0.0902		0.0468	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Thorium 228</b>	<b>0.368</b>		0.0919	0.102		0.0486	pCi/g	11/20/20 15:32	12/11/20 23:24	1
<b>Thorium-232</b>	<b>0.459</b>		0.160	0.168		0.0324	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Thorium-234	-0.0831	U	1.14	1.14		0.941	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Uranium-235	-0.225	U	0.108	0.111		0.526	pCi/g	11/20/20 15:32	12/11/20 23:24	1
Uranium-238	-0.0831	U	1.14	1.14		0.941	pCi/g	11/20/20 15:32	12/11/20 23:24	1

**Client Sample ID: HPPG-ESU-TU099A-024**

**Lab Sample ID: 160-40340-24**

Date Collected: 11/06/20 15:41

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.439</b>		0.162	0.168		0.0797	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Actinium-227	0.0591	U	0.215	0.215		0.255	pCi/g	11/20/20 15:32	12/14/20 21:03	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

**Client Sample ID: HPPG-ESU-TU099A-024**

**Lab Sample ID: 160-40340-24**

Date Collected: 11/06/20 15:41

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-212	-0.109	U	0.541	0.541		0.430	pCi/g	11/20/20 15:32	12/14/20 21:03	1
<b>Bismuth-214</b>	<b>0.403</b>		0.103	0.111		0.0388	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Cesium-137	0.0145	U	0.0431	0.0432	0.0700	0.0342	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Lead-210	0.460	U	1.02	1.03		0.818	pCi/g	11/20/20 15:32	12/14/20 21:03	1
<b>Lead-212</b>	<b>0.428</b>		0.0721	0.0909		0.0302	pCi/g	11/20/20 15:32	12/14/20 21:03	1
<b>Lead-214</b>	<b>0.405</b>		0.100	0.109		0.0396	pCi/g	11/20/20 15:32	12/14/20 21:03	1
<b>Potassium-40</b>	<b>8.10</b>		1.10	1.38		0.231	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Protactinium-231	0.275	U	1.01	1.01		1.60	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Protactinium-234	-0.0834	U	0.238	0.238		0.194	pCi/g	11/20/20 15:32	12/14/20 21:03	1
<b>Radium-226</b>	<b>0.403</b>		0.103	0.111	0.200	0.0388	pCi/g	11/20/20 15:32	12/14/20 21:03	1
<b>Radium-228</b>	<b>0.439</b>		0.162	0.168		0.0797	pCi/g	11/20/20 15:32	12/14/20 21:03	1
<b>Thallium-208</b>	<b>0.0708</b>		0.0487	0.0492		0.0239	pCi/g	11/20/20 15:32	12/14/20 21:03	1
<b>Thorium 228</b>	<b>0.428</b>		0.0721	0.0909		0.0302	pCi/g	11/20/20 15:32	12/14/20 21:03	1
<b>Thorium-232</b>	<b>0.439</b>		0.162	0.168		0.0797	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Thorium-234	0.0863	U	0.430	0.430		0.693	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Uranium-235	0.0597	U	0.187	0.187		0.349	pCi/g	11/20/20 15:32	12/14/20 21:03	1
Uranium-238	0.0863	U	0.430	0.430		0.693	pCi/g	11/20/20 15:32	12/14/20 21:03	1

**Client Sample ID: HPPG-ESU-TU099A-025**

**Lab Sample ID: 160-40340-25**

Date Collected: 11/06/20 15:43

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.657</b>		0.170	0.183		0.0875	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Actinium-227	0.102	U	0.403	0.403		0.321	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Bismuth-212	0.442	U	0.945	0.946		0.747	pCi/g	11/20/20 16:22	12/11/20 11:17	1
<b>Bismuth-214</b>	<b>0.465</b>		0.152	0.159		0.0635	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Cesium-137	0.00108	U	0.0500	0.0500	0.0700	0.0411	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Lead-210	0.900	U	1.52	1.53		1.20	pCi/g	11/20/20 16:22	12/11/20 11:17	1
<b>Lead-212</b>	<b>0.419</b>		0.0964	0.111		0.0525	pCi/g	11/20/20 16:22	12/11/20 11:17	1
<b>Lead-214</b>	<b>0.416</b>		0.106	0.115		0.0604	pCi/g	11/20/20 16:22	12/11/20 11:17	1
<b>Potassium-40</b>	<b>9.42</b>		1.37	1.68		0.262	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Protactinium-231	0.000	U	0.950	0.950		2.21	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Protactinium-234	0.0743	U	0.240	0.240		0.211	pCi/g	11/20/20 16:22	12/11/20 11:17	1
<b>Radium-226</b>	<b>0.465</b>		0.152	0.159	0.200	0.0635	pCi/g	11/20/20 16:22	12/11/20 11:17	1
<b>Radium-228</b>	<b>0.657</b>		0.170	0.183		0.0875	pCi/g	11/20/20 16:22	12/11/20 11:17	1
<b>Thallium-208</b>	<b>0.191</b>		0.0649	0.0679		0.0246	pCi/g	11/20/20 16:22	12/11/20 11:17	1
<b>Thorium 228</b>	<b>0.419</b>		0.0964	0.111		0.0525	pCi/g	11/20/20 16:22	12/11/20 11:17	1
<b>Thorium-232</b>	<b>0.657</b>		0.170	0.183		0.0875	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Thorium-234	-0.628	U	0.989	0.992		0.830	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Uranium-235	0.0846	U	0.315	0.315		0.270	pCi/g	11/20/20 16:22	12/11/20 11:17	1
Uranium-238	-0.628	U	0.989	0.992		0.830	pCi/g	11/20/20 16:22	12/11/20 11:17	1

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

**Client Sample ID: HPPG-F-029**

**Lab Sample ID: 160-40340-26**

Date Collected: 11/06/20 14:34

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Strontium-90	-0.0272	U	0.160	0.160	0.160	0.134	pCi/g	12/16/20 14:29	01/04/21 13:53	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	95.5		40 - 110					12/16/20 14:29	01/04/21 13:53	1
Y Carrier	88.2		40 - 110					12/16/20 14:29	01/04/21 13:53	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.128</b>		0.152	0.152		0.105	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Actinium-227	0.0457	U	0.510	0.510		0.315	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Bismuth-212	-0.402	U	0.996	0.997		0.788	pCi/g	11/20/20 16:22	12/11/20 11:19	1
<b>Bismuth-214</b>	<b>0.369</b>		0.126	0.131		0.0482	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Cesium-137	0.0184	U	0.0497	0.0498	0.0700	0.0386	pCi/g	11/20/20 16:22	12/11/20 11:19	1
<b>Lead-210</b>	<b>1.54</b>		1.80	1.81		1.41	pCi/g	11/20/20 16:22	12/11/20 11:19	1
<b>Lead-212</b>	<b>0.310</b>		0.0729	0.0798		0.0328	pCi/g	11/20/20 16:22	12/11/20 11:19	1
<b>Lead-214</b>	<b>0.303</b>		0.0930	0.0980		0.0402	pCi/g	11/20/20 16:22	12/11/20 11:19	1
<b>Potassium-40</b>	<b>8.07</b>		1.42	1.64		0.209	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Protactinium-231	0.490	U	1.53	1.53		1.61	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Protactinium-234	0.120	U	0.231	0.231		0.151	pCi/g	11/20/20 16:22	12/11/20 11:19	1
<b>Radium-226</b>	<b>0.369</b>		0.126	0.131	0.200	0.0482	pCi/g	11/20/20 16:22	12/11/20 11:19	1
<b>Radium-228</b>	<b>0.128</b>		0.152	0.152		0.105	pCi/g	11/20/20 16:22	12/11/20 11:19	1
<b>Thallium-208</b>	<b>0.110</b>		0.0429	0.0443		0.0118	pCi/g	11/20/20 16:22	12/11/20 11:19	1
<b>Thorium 228</b>	<b>0.310</b>		0.0729	0.0798		0.0328	pCi/g	11/20/20 16:22	12/11/20 11:19	1
<b>Thorium-232</b>	<b>0.128</b>		0.152	0.152		0.105	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Thorium-234	-0.0328	U	0.0692	0.0693		0.650	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Uranium-235	-0.0335	U	0.417	0.417		0.311	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Uranium-238	-0.0328	U	0.0692	0.0693		0.650	pCi/g	11/20/20 16:22	12/11/20 11:19	1

**Client Sample ID: HPPG-F-030**

**Lab Sample ID: 160-40340-27**

Date Collected: 11/06/20 14:57

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
<b>Actinium 228</b>	<b>0.399</b>		0.150	0.156		0.0824	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Actinium-227	-0.326	U	0.697	0.698		0.420	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Bismuth-212	0.360	U	0.778	0.779		0.599	pCi/g	11/20/20 16:22	12/11/20 11:19	1
<b>Bismuth-214</b>	<b>0.225</b>		0.150	0.152		0.0783	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Cesium-137	-0.0288	U	0.0490	0.0491	0.0700	0.0702	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Lead-210	-0.154	U	1.27	1.27		0.913	pCi/g	11/20/20 16:22	12/11/20 11:19	1
<b>Lead-212</b>	<b>0.224</b>		0.0769	0.0822		0.0425	pCi/g	11/20/20 16:22	12/11/20 11:19	1
<b>Lead-214</b>	<b>0.249</b>		0.108	0.111		0.0599	pCi/g	11/20/20 16:22	12/11/20 11:19	1
<b>Potassium-40</b>	<b>6.56</b>		1.36	1.51		0.260	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Protactinium-231	0.000	U	0.588	0.588		1.65	pCi/g	11/20/20 16:22	12/11/20 11:19	1

Eurofins TestAmerica, St. Louis

# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

**Client Sample ID: HPPG-F-030**

**Lab Sample ID: 160-40340-27**

Date Collected: 11/06/20 14:57

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Protactinium-234	0.337		0.165	0.168		0.157	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Radium-226	0.225		0.150	0.152	0.200	0.0783	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Radium-228	0.399		0.150	0.156		0.0824	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Thallium-208	0.0969		0.0435	0.0447		0.0145	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Thorium 228	0.224		0.0769	0.0822		0.0425	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Thorium-232	0.399		0.150	0.156		0.0824	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Thorium-234	0.307	U	0.412	0.413		0.313	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Uranium-235	-0.140	U	0.222	0.222		0.248	pCi/g	11/20/20 16:22	12/11/20 11:19	1
Uranium-238	0.307	U	0.412	0.413		0.313	pCi/g	11/20/20 16:22	12/11/20 11:19	1

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

## Method: 905 - Strontium-90 (GFPC)

**Lab Sample ID: MB 160-492111/22-A**  
**Matrix: Solid**  
**Analysis Batch: 493835**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 492111**

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	-0.03798	U	0.125	0.125	0.160	0.106	pCi/g	12/16/20 14:29	01/04/21 13:58	1
<b>Carrier</b>	<b>MB MB</b>		<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
	<b>%Yield</b>	<b>Qualifier</b>								
Sr Carrier	96.8		40 - 110					12/16/20 14:29	01/04/21 13:58	1
Y Carrier	94.6		40 - 110					12/16/20 14:29	01/04/21 13:58	1

**Lab Sample ID: LCS 160-492111/1-A**  
**Matrix: Solid**  
**Analysis Batch: 493723**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 492111**

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Strontium-90	7.75	6.756		0.712	0.160	0.115	pCi/g	87	75 - 125
<b>Carrier</b>	<b>LCS LCS</b>		<b>Limits</b>						
	<b>%Yield</b>	<b>Qualifier</b>							
Sr Carrier	102		40 - 110						
Y Carrier	94.6		40 - 110						

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

**Lab Sample ID: MB 160-489844/1-A**  
**Matrix: Solid**  
**Analysis Batch: 491443**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 489844**

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.04908	U	0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Actinium-227	0.06310	U	0.159	0.159		0.330	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Bismuth-212	0.0000	U	0.133	0.133		0.335	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Bismuth-214	-0.008210	U	0.114	0.114		0.0941	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Cesium-137	0.007259	U	0.0689	0.0689	0.0700	0.0558	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-210	1.261		1.60	1.61		1.05	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-212	0.01003	U	0.0884	0.0884		0.0716	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Lead-214	0.03327	U	0.0785	0.0786		0.0761	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Potassium-40	-0.5926	U	0.723	0.726		0.723	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Protactinium-231	0.3075	U	0.995	0.995		0.778	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Protactinium-234	0.03644	U	0.0817	0.0817		0.166	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Radium-226	-0.008210	U	0.114	0.114	0.200	0.0941	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Radium-228	0.04908	U	0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thallium-208	0.04141		0.0370	0.0373		0.0238	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium 228	0.01003	U	0.0884	0.0884		0.0716	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium-232	0.04908	U	0.203	0.203		0.106	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Thorium-234	-1.112	U	0.612	0.624		0.718	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Uranium-235	-0.04770	U	0.334	0.334		0.304	pCi/g	11/20/20 14:56	12/11/20 08:10	1
Uranium-238	-1.112	U	0.612	0.624		0.718	pCi/g	11/20/20 14:56	12/11/20 08:10	1

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

**Lab Sample ID: LCS 160-489844/2-A**  
**Matrix: Solid**  
**Analysis Batch: 491441**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 489844**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec.
									Limits
Americium-241	96.4	97.37		10.2		0.588	pCi/g	101	87 - 116
Cesium-137	26.7	26.30		2.84	0.0700	0.0907	pCi/g	98	87 - 120
Cobalt-60	9.47	9.183		0.997		0.0186	pCi/g	97	87 - 115

**Lab Sample ID: 160-40340-4 DU**  
**Matrix: Solid**  
**Analysis Batch: 491439**

**Client Sample ID: HPPG-ESU-TU099A-004**  
**Prep Type: Total/NA**  
**Prep Batch: 489844**

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER
										Limit
Actinium 228	0.345		0.6218		0.204		0.0908	pCi/g	0.67	1
Actinium-227	0.0809	U	0.1662	U	0.472		0.365	pCi/g	0.14	1
Bismuth-212	-0.444	U	-0.02517	U	0.790		0.648	pCi/g	0.32	1
Bismuth-214	0.472		0.3936		0.148		0.0657	pCi/g	0.29	1
Cesium-137	0.0200	U	0.03126	U	0.0780	0.0700	0.0614	pCi/g	0.09	1
Lead-210	0.574	U	1.418		1.52		1.16	pCi/g	0.30	1
Lead-212	0.371		0.2969		0.114		0.0698	pCi/g	0.37	1
Lead-214	0.379		0.4735		0.125		0.0551	pCi/g	0.41	1
Potassium-40	8.77		8.582		1.77		0.280	pCi/g	0.06	1
Protactinium-231	0.000	U	0.7288	U	2.58		2.09	pCi/g	0.24	1
Protactinium-234	0.0736	U	-0.00389	U	0.00595		0.283	pCi/g	0.45	1
Radium-226	0.472		0.3936		0.148	0.200	0.0657	pCi/g	0.29	1
Radium-228	0.345		0.6218		0.204		0.0908	pCi/g	0.67	1
Thallium-208	0.128		0.2152		0.0641		0.0174	pCi/g	0.82	1
Thorium 228	0.371		0.2969		0.114		0.0698	pCi/g	0.37	1
Thorium-232	0.345		0.6218		0.204		0.0908	pCi/g	0.67	1
Thorium-234	0.501		-0.2045	U	1.34		1.11	pCi/g	0.42	1
Uranium-235	0.0135	U	0.06258	U	0.281		0.526	pCi/g	0.12	1
Uranium-238	0.501		-0.2045	U	1.34		1.11	pCi/g	0.42	1

**Lab Sample ID: MB 160-489851/1-A**  
**Matrix: Solid**  
**Analysis Batch: 491606**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 489851**

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
										1
Actinium 228	-0.1227	U	0.313	0.313		0.158	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Actinium-227	0.08274	U	0.201	0.202		0.309	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Bismuth-212	0.0000	U	0.114	0.114		0.666	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Bismuth-214	-0.02362	U	0.184	0.184		0.152	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Cesium-137	-0.003155	U	0.0568	0.0568	0.0700	0.0463	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Lead-210	1.156		1.59	1.60		1.07	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Lead-212	0.0000164	U	0.101	0.101		0.0829	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Lead-214	-0.04248	U	0.144	0.144		0.121	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Potassium-40	-0.1359	U	0.827	0.827		0.388	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Protactinium-231	0.0000001	U	2.93	2.93		2.41	pCi/g	11/20/20 15:32	12/11/20 21:59	1

Eurofins TestAmerica, St. Louis

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

**Lab Sample ID: MB 160-489851/1-A**  
**Matrix: Solid**  
**Analysis Batch: 491606**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 489851**

Analyte	MB MB		Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier								
Protactinium-234	0.09106	U	0.242	0.242		0.200	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Radium-226	-0.02362	U	0.184	0.184	0.200	0.152	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Radium-228	-0.1227	U	0.313	0.313		0.158	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Thallium-208	0.004349	U	0.0646	0.0646		0.0365	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Thorium 228	0.0000164	U	0.101	0.101		0.0829	pCi/g	11/20/20 15:32	12/11/20 21:59	1
	7									
Thorium-232	-0.1227	U	0.313	0.313		0.158	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Thorium-234	-0.4208	U	0.927	0.928		0.779	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Uranium-235	-0.1593	U	0.461	0.462		0.372	pCi/g	11/20/20 15:32	12/11/20 21:59	1
Uranium-238	-0.4208	U	0.927	0.928		0.779	pCi/g	11/20/20 15:32	12/11/20 21:59	1

**Lab Sample ID: LCS 160-489851/2-A**  
**Matrix: Solid**  
**Analysis Batch: 491435**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 489851**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Cesium-137	26.7	25.07		2.67	0.0700	0.0792	pCi/g	94	87 - 120
Cobalt-60	9.47	8.743		0.919		0.00931	pCi/g	92	87 - 115

**Lab Sample ID: 160-40340-24 DU**  
**Matrix: Solid**  
**Analysis Batch: 491646**

**Client Sample ID: HPPG-ESU-TU099A-024**  
**Prep Type: Total/NA**  
**Prep Batch: 489851**

Analyte	Sample Sample		DU DU		Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
	Result	Qual	Result	Qual						
Actinium 228	0.439		0.4778		0.118		0.0197	pCi/g	0.13	1
Actinium-227	0.0591	U	0.1847	U	0.358		0.204	pCi/g	0.22	1
Bismuth-212	-0.109	U	0.0000	U	0.378		0.493	pCi/g	0.12	1
Bismuth-214	0.403		0.2733		0.0960		0.0435	pCi/g	0.63	1
Cesium-137	0.0145	U	0.01877	U	0.0436	0.0700	0.0343	pCi/g	0.05	1
Lead-210	0.460	U	0.5001	U	0.986		0.784	pCi/g	0.02	1
Lead-212	0.428		0.3142		0.0749		0.0290	pCi/g	0.69	1
Lead-214	0.405		0.3300		0.0877		0.0401	pCi/g	0.38	1
Potassium-40	8.10		7.837		1.30		0.0777	pCi/g	0.1	1
Protactinium-231	0.275	U	0.0000	U	0.239		1.58	pCi/g	0.22	1
Protactinium-234	-0.0834	U	-0.08818	U	0.247		0.201	pCi/g	0.01	1
Radium-226	0.403		0.2733		0.0960	0.200	0.0435	pCi/g	0.63	1
Radium-228	0.439		0.4778		0.118		0.0197	pCi/g	0.13	1
Thallium-208	0.0708		0.1260		0.0348		0.00481	pCi/g	0.66	1
Thorium 228	0.428		0.3142		0.0749		0.0290	pCi/g	0.69	1
Thorium-232	0.439		0.4778		0.118		0.0197	pCi/g	0.13	1
Thorium-234	0.0863	U	0.000173	U	0.000324		0.713	pCi/g	0.20	1
			0							
Uranium-235	0.0597	U	-0.1527	U	0.437		0.356	pCi/g	0.34	1
Uranium-238	0.0863	U	0.000173	U	0.000324		0.713	pCi/g	0.20	1
			0							

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-489908/2-A  
 Matrix: Solid  
 Analysis Batch: 491438

Client Sample ID: Lab Control Sample  
 Prep Type: Total/NA  
 Prep Batch: 489908

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec.
									Limits
Americium-241	96.4	98.60		12.8		0.643	pCi/g	102	87 - 116
Cesium-137	26.7	29.83		3.54	0.0700	0.135	pCi/g	112	87 - 120
Cobalt-60	9.47	10.16		1.22		0.0830	pCi/g	107	87 - 115

# QC Association Summary

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

## Rad

### Leach Batch: 489016

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40340-1	HPPG-ESU-TU099A-001	Total/NA	Solid	Dry and Grind	
160-40340-2	HPPG-ESU-TU099A-002	Total/NA	Solid	Dry and Grind	
160-40340-3	HPPG-ESU-TU099A-003	Total/NA	Solid	Dry and Grind	
160-40340-4	HPPG-ESU-TU099A-004	Total/NA	Solid	Dry and Grind	
160-40340-5	HPPG-ESU-TU099A-005	Total/NA	Solid	Dry and Grind	
160-40340-6	HPPG-ESU-TU099A-006	Total/NA	Solid	Dry and Grind	
160-40340-7	HPPG-ESU-TU099A-007	Total/NA	Solid	Dry and Grind	
160-40340-8	HPPG-ESU-TU099A-008	Total/NA	Solid	Dry and Grind	
160-40340-9	HPPG-ESU-TU099A-009	Total/NA	Solid	Dry and Grind	
160-40340-10	HPPG-ESU-TU099A-010	Total/NA	Solid	Dry and Grind	
160-40340-11	HPPG-ESU-TU099A-011	Total/NA	Solid	Dry and Grind	
160-40340-12	HPPG-ESU-TU099A-012	Total/NA	Solid	Dry and Grind	
160-40340-13	HPPG-ESU-TU099A-013	Total/NA	Solid	Dry and Grind	
160-40340-14	HPPG-ESU-TU099A-014	Total/NA	Solid	Dry and Grind	
160-40340-4 DU	HPPG-ESU-TU099A-004	Total/NA	Solid	Dry and Grind	

### Leach Batch: 489020

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40340-15	HPPG-ESU-TU099A-015	Total/NA	Solid	Dry and Grind	
160-40340-16	HPPG-ESU-TU099A-016	Total/NA	Solid	Dry and Grind	
160-40340-17	HPPG-ESU-TU099A-017	Total/NA	Solid	Dry and Grind	
160-40340-18	HPPG-ESU-TU099A-018	Total/NA	Solid	Dry and Grind	
160-40340-19	HPPG-ESU-TU099A-019	Total/NA	Solid	Dry and Grind	
160-40340-20	HPPG-ESU-TU099A-020	Total/NA	Solid	Dry and Grind	
160-40340-21	HPPG-ESU-TU099A-021	Total/NA	Solid	Dry and Grind	
160-40340-22	HPPG-ESU-TU099A-022	Total/NA	Solid	Dry and Grind	
160-40340-23	HPPG-ESU-TU099A-023	Total/NA	Solid	Dry and Grind	
160-40340-24	HPPG-ESU-TU099A-024	Total/NA	Solid	Dry and Grind	
160-40340-25	HPPG-ESU-TU099A-025	Total/NA	Solid	Dry and Grind	
160-40340-26	HPPG-F-029	Total/NA	Solid	Dry and Grind	
160-40340-27	HPPG-F-030	Total/NA	Solid	Dry and Grind	
160-40340-24 DU	HPPG-ESU-TU099A-024	Total/NA	Solid	Dry and Grind	

### Prep Batch: 489844

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40340-1	HPPG-ESU-TU099A-001	Total/NA	Solid	Fill_Geo-21	489016
160-40340-2	HPPG-ESU-TU099A-002	Total/NA	Solid	Fill_Geo-21	489016
160-40340-3	HPPG-ESU-TU099A-003	Total/NA	Solid	Fill_Geo-21	489016
160-40340-4	HPPG-ESU-TU099A-004	Total/NA	Solid	Fill_Geo-21	489016
MB 160-489844/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489844/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40340-4 DU	HPPG-ESU-TU099A-004	Total/NA	Solid	Fill_Geo-21	489016

### Prep Batch: 489851

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40340-5	HPPG-ESU-TU099A-005	Total/NA	Solid	Fill_Geo-21	489016
160-40340-6	HPPG-ESU-TU099A-006	Total/NA	Solid	Fill_Geo-21	489016
160-40340-7	HPPG-ESU-TU099A-007	Total/NA	Solid	Fill_Geo-21	489016
160-40340-8	HPPG-ESU-TU099A-008	Total/NA	Solid	Fill_Geo-21	489016
160-40340-9	HPPG-ESU-TU099A-009	Total/NA	Solid	Fill_Geo-21	489016
160-40340-10	HPPG-ESU-TU099A-010	Total/NA	Solid	Fill_Geo-21	489016

# QC Association Summary

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
 SDG: GJ46599773

## Rad (Continued)

### Prep Batch: 489851 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40340-11	HPPG-ESU-TU099A-011	Total/NA	Solid	Fill_Geo-21	489016
160-40340-12	HPPG-ESU-TU099A-012	Total/NA	Solid	Fill_Geo-21	489016
160-40340-13	HPPG-ESU-TU099A-013	Total/NA	Solid	Fill_Geo-21	489016
160-40340-14	HPPG-ESU-TU099A-014	Total/NA	Solid	Fill_Geo-21	489016
160-40340-15	HPPG-ESU-TU099A-015	Total/NA	Solid	Fill_Geo-21	489020
160-40340-16	HPPG-ESU-TU099A-016	Total/NA	Solid	Fill_Geo-21	489020
160-40340-17	HPPG-ESU-TU099A-017	Total/NA	Solid	Fill_Geo-21	489020
160-40340-18	HPPG-ESU-TU099A-018	Total/NA	Solid	Fill_Geo-21	489020
160-40340-19	HPPG-ESU-TU099A-019	Total/NA	Solid	Fill_Geo-21	489020
160-40340-20	HPPG-ESU-TU099A-020	Total/NA	Solid	Fill_Geo-21	489020
160-40340-21	HPPG-ESU-TU099A-021	Total/NA	Solid	Fill_Geo-21	489020
160-40340-22	HPPG-ESU-TU099A-022	Total/NA	Solid	Fill_Geo-21	489020
160-40340-23	HPPG-ESU-TU099A-023	Total/NA	Solid	Fill_Geo-21	489020
160-40340-24	HPPG-ESU-TU099A-024	Total/NA	Solid	Fill_Geo-21	489020
MB 160-489851/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489851/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40340-24 DU	HPPG-ESU-TU099A-024	Total/NA	Solid	Fill_Geo-21	489020

### Prep Batch: 489908

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40340-25	HPPG-ESU-TU099A-025	Total/NA	Solid	Fill_Geo-21	489020
160-40340-26	HPPG-F-029	Total/NA	Solid	Fill_Geo-21	489020
160-40340-27	HPPG-F-030	Total/NA	Solid	Fill_Geo-21	489020
LCS 160-489908/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

### Prep Batch: 492111

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40340-1	HPPG-ESU-TU099A-001	Total/NA	Solid	DPS-7	489016
160-40340-11	HPPG-ESU-TU099A-011	Total/NA	Solid	DPS-7	489016
160-40340-21	HPPG-ESU-TU099A-021	Total/NA	Solid	DPS-7	489020
160-40340-26	HPPG-F-029	Total/NA	Solid	DPS-7	489020
MB 160-492111/22-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-492111/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

# Tracer/Carrier Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40340-1  
SDG: GJ46599773

Method: 905 - Strontium-90 (GFPC)

Matrix: Solid

Prep Type: Total/NA

Lab Sample ID	Client Sample ID	Percent Yield (Acceptance Limits)	
		Sr (40-110)	Y (40-110)
160-40340-1	HPPG-ESU-TU099A-001	96.4	93.1
160-40340-11	HPPG-ESU-TU099A-011	98.8	91.2
160-40340-21	HPPG-ESU-TU099A-021	100	90.8
160-40340-26	HPPG-F-029	95.5	88.2
LCS 160-492111/1-A	Lab Control Sample	102	94.6
MB 160-492111/22-A	Method Blank	96.8	94.6

**Tracer/Carrier Legend**

Sr = Sr Carrier

Y = Y Carrier



Environment Testing  
America

## ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis  
13715 Rider Trail North  
Earth City, MO 63045  
Tel: (314)298-8566

Laboratory Job ID: 160-40342-1  
Laboratory Sample Delivery Group: D1189462  
Client Project/Site: HPNS-Parcel G 501197  
Revision: 1

For:  
Aptim Federal Services LLC  
4005 Port Chicago Hwy, Suite 200  
Concord, California 94520

Attn: Rose Condit

*Rhonda Ridenhower*

Authorized for release by:  
4/20/2021 11:09:43 AM

Rhonda Ridenhower, Client Service Manager  
(314)298-8566  
Rhonda.Ridenhower@Eurofinset.com

### LINKS

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results through  
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The  
Expert**

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[www.eurofinsus.com/Env](http://www.eurofinsus.com/Env)

*This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.*

*Results relate only to the items tested and the sample(s) as received by the laboratory.*

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# Case Narrative

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Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1  
SDG: D1189462

Job ID: 160-40342-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

## CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40342-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for strontium

# Case Narrative

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1  
SDG: D1189462

## Job ID: 160-40342-1 (Continued)

### Laboratory: Eurofins TestAmerica, St. Louis (Continued)

#### RECEIPT

The samples were received on 11/11/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 12.2 C.

#### STRONTIUM-90 (GFPC)

Sample HPPG-ESU-TU099A-B-001 (160-40342-1) was analyzed for Strontium-90 (GFPC) in accordance with EPA 905. The samples were dried on 11/13/2020, prepared on 12/16/2020 and analyzed on 01/04/2021.

Strontium-90 prep batch 492111

The method blank (MB) z-score associated with Prep Batch 160-492111 is within limits and is stored in the level IV raw data. (MB 160-492111/22-A)

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-ESU-TU099A-B-001 (160-40342-1).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

#### RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-ESU-TU099A-B-001 (160-40342-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA\_01\_R. The samples were dried on 11/13/2020, prepared on 11/20/2020 and analyzed on 12/11/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Gamma prep batch 489908

The MB z-score for Bi-214/Ra-226 associated with Prep Batch 160-489908 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-489908/1-A)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



APTIM Federal Services, LLC

4005 Port Chicago Hwy  
Concord, CA 94520

Project Manager: Lisa Bercik  
Phone #: (619)213-3389

Send Report to: Rose Condit  
Phone/Fax Number: 415-987-0780  
Address: 4005 Port Chicago Hwy

Sample Lead: Murn, Andrew

Sample Tech(s): Paul Leblanc  
Joaquin Ramirez

# CHAIN OF CUSTODY

Ref. Document # 501197RSY-028

Page 1 of 2

Project Number: 501197  
 Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action  
 Project Location: San Francisco, CA  
 Purchase Order #: 1159058  
 Shipment/Pickup Date: 11/10/2020  
 Waybill Number: 44907 0225 5465  
 Lab Destination: Test America (St. Louis Lab)  
 13715 Rider Trail North  
 Earth City, MO 63046  
 Lab Contact Name/ph #: Rhonda Ridenbower (314)298-8566

Sample ID	Collection Information		Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Analysis Requested			Dose Rate uR/hr	Evidence Bag ID	Comment	
	Date	Time						Method	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)				
HPPG-ESU-TJ059A-B-001	11/17/2020	10:11	G	SO 1	16 oz. plastic jar			X	X				D1189462	

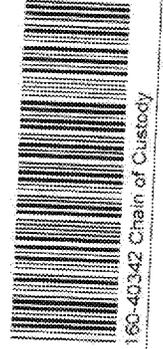
Special Instructions: Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g  
 21 day ingrowth results only

Turnaround Time: 3-day  10-Day  28-day  Other

Method Codes: C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murn, Andrew	<i>Andrew Murn</i>	11/07/2020 15:07	Andrew Murn	<i>Andrew Murn</i>	11/07/2020 15:07
Locked Storage (RKilipack)	<i>Andrew Murn</i>	11/10/2020 13:03	Andrew Murn	<i>Andrew Murn</i>	11/10/2020 13:03
Andrew Murn	<i>Andrew Murn</i>	11/10/2020 13:11	SHIPPED TO LAB VIA FedEx	<i>Mina Keri</i>	11/10/2020 13:03

\*\*\* Last 3 transfers shown above - Complete list of transfers on last page \*\*\*



160-40342 Chain of Custody



# All Transfers for COC 501197RSY-028

Page 2 of 2

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Murri, Andrew	<i>Andrew Murri</i>	11/07/2020 15:07	Locked Storage (RKilipack)	<i>Andrew Murri</i>	11/07/2020 15:07
Locked Storage (RKilipack)	<i>Andrew Murri</i>	11/10/2020 13:03	Andrew Murri	<i>Andrew Murri</i>	11/10/2020 13:03
Andrew Murri	<i>Andrew Murri</i>	11/10/2020 13:11	SHIPPED TO LAB VIA POLAR	<i>Michael Kenning</i>	11/10/2020 09:05



## Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40342-1

SDG Number: D1189462

**Login Number: 40342****List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Korrinhizer, Micha L**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

# Definitions/Glossary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1  
SDG: D1189462

## Qualifiers

### Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

## Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

# Method Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1  
SDG: D1189462

Method	Method Description	Protocol	Laboratory
905	Strontium-90 (GFPC)	EPA	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-7	Preparation, Digestion/Precipitate Separation (7-Day In-Growth)	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

**Protocol References:**

- DOE = U.S. Department of Energy
- EPA = US Environmental Protection Agency
- None = None

**Laboratory References:**

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

# Sample Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1  
SDG: D1189462

---

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40342-1	HPPG-ESU-TU099A-B-001	Solid	11/07/20 10:11	11/11/20 09:05	

---



# Client Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1  
 SDG: D1189462

**Client Sample ID: HPPG-ESU-TU099A-B-001**

**Lab Sample ID: 160-40342-1**

Date Collected: 11/07/20 10:11

Matrix: Solid

Date Received: 11/11/20 09:05

**Method: 905 - Strontium-90 (GFPC)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Strontium-90	0.0492	U	0.150	0.150	0.331	0.119	pCi/g	12/16/20 14:29	01/04/21 13:54	1
<b>Carrier</b>	<b>%Yield</b>	<b>Qualifier</b>	<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
Sr Carrier	90.9		40 - 110					12/16/20 14:29	01/04/21 13:54	1
Y Carrier	87.9		40 - 110					12/16/20 14:29	01/04/21 13:54	1

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)**

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
<b>Actinium 228</b>	<b>0.325</b>		0.242	0.245		0.125	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Actinium-227	0.151	U	0.292	0.293		0.371	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Bismuth-212	-0.470	U	1.19	1.19		0.948	pCi/g	11/20/20 16:22	12/11/20 12:38	1
<b>Bismuth-214</b>	<b>0.621</b>		0.147	0.161		0.0483	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Cesium-137	-0.0273	U	0.0808	0.0808	0.0700	0.0642	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Lead-210	-0.310	U	1.98	1.98		1.64	pCi/g	11/20/20 16:22	12/11/20 12:38	1
<b>Lead-212</b>	<b>0.330</b>		0.113	0.121		0.0733	pCi/g	11/20/20 16:22	12/11/20 12:38	1
<b>Lead-214</b>	<b>0.327</b>		0.134	0.139		0.0632	pCi/g	11/20/20 16:22	12/11/20 12:38	1
<b>Potassium-40</b>	<b>9.92</b>		1.66	1.95		0.284	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Protactinium-231	0.000	U	0.795	0.795		2.50	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Protactinium-234	0.0000363	U	0.000139	0.000139		0.247	pCi/g	11/20/20 16:22	12/11/20 12:38	1
<b>Radium-226</b>	<b>0.621</b>		0.147	0.161	0.200	0.0483	pCi/g	11/20/20 16:22	12/11/20 12:38	1
<b>Radium-228</b>	<b>0.325</b>		0.242	0.245		0.125	pCi/g	11/20/20 16:22	12/11/20 12:38	1
<b>Thallium-208</b>	<b>0.164</b>		0.0548	0.0574		0.0177	pCi/g	11/20/20 16:22	12/11/20 12:38	1
<b>Thorium 228</b>	<b>0.330</b>		0.113	0.121		0.0733	pCi/g	11/20/20 16:22	12/11/20 12:38	1
<b>Thorium-232</b>	<b>0.325</b>		0.242	0.245		0.125	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Thorium-234	-0.147	U	1.28	1.28		1.06	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Uranium-235	-0.00863	U	0.326	0.326		0.427	pCi/g	11/20/20 16:22	12/11/20 12:38	1
Uranium-238	-0.147	U	1.28	1.28		1.06	pCi/g	11/20/20 16:22	12/11/20 12:38	1

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1  
 SDG: D1189462

## Method: 905 - Strontium-90 (GFPC)

**Lab Sample ID: MB 160-492111/22-A**  
**Matrix: Solid**  
**Analysis Batch: 493835**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 492111**

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Strontium-90	-0.03798	U	0.125	0.125	0.331	0.106	pCi/g	12/16/20 14:29	01/04/21 13:58	1
<b>Carrier</b>	<b>MB MB</b>		<b>Limits</b>					<b>Prepared</b>	<b>Analyzed</b>	<b>Dil Fac</b>
	<b>%Yield</b>	<b>Qualifier</b>								
Sr Carrier	96.8		40 - 110					12/16/20 14:29	01/04/21 13:58	1
Y Carrier	94.6		40 - 110					12/16/20 14:29	01/04/21 13:58	1

**Lab Sample ID: LCS 160-492111/1-A**  
**Matrix: Solid**  
**Analysis Batch: 493723**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 492111**

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Strontium-90	7.75	6.756		0.712	0.331	0.115	pCi/g	87	75 - 125
<b>Carrier</b>	<b>LCS LCS</b>		<b>Limits</b>						
	<b>%Yield</b>	<b>Qualifier</b>							
Sr Carrier	102		40 - 110						
Y Carrier	94.6		40 - 110						

## Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

**Lab Sample ID: MB 160-489908/1-A**  
**Matrix: Solid**  
**Analysis Batch: 491436**

**Client Sample ID: Method Blank**  
**Prep Type: Total/NA**  
**Prep Batch: 489908**

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.07523		0.0614	0.0619		0.0292	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Actinium-227	0.1329	U	0.209	0.210		0.169	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Bismuth-212	-0.03769	U	0.485	0.485		0.400	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Bismuth-214	0.02458	U	0.0333	0.0334		0.104	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Cesium-137	0.001115	U	0.0388	0.0388	0.0700	0.0318	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Lead-210	-0.5657	U	1.19	1.19		0.944	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Lead-212	-0.004504	U	0.0798	0.0798		0.0671	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Lead-214	-0.008625	U	0.0863	0.0863		0.0707	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Potassium-40	0.1471	U	0.442	0.442		0.327	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Protactinium-231	0.0000000	U	1.81	1.81		1.49	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Protactinium-234	0.07847	U	0.143	0.143		0.124	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Radium-226	0.02458	U	0.0333	0.0334	0.200	0.104	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Radium-228	0.07523		0.0614	0.0619		0.0292	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Thallium-208	-0.02488	U	0.0453	0.0454		0.0372	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Thorium 228	-0.004504	U	0.0798	0.0798		0.0671	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Thorium-232	0.07523		0.0614	0.0619		0.0292	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Thorium-234	0.0000	U	0.183	0.183		0.509	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Uranium-235	0.01428	U	0.167	0.167		0.236	pCi/g	11/20/20 16:22	12/11/20 22:33	1
Uranium-238	0.0000	U	0.183	0.183		0.509	pCi/g	11/20/20 16:22	12/11/20 22:33	1

# QC Sample Results

Client: Aptim Federal Services LLC  
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1  
 SDG: D1189462

**Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)**

**Lab Sample ID: LCS 160-489908/2-A**  
**Matrix: Solid**  
**Analysis Batch: 491438**

**Client Sample ID: Lab Control Sample**  
**Prep Type: Total/NA**  
**Prep Batch: 489908**

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec.
									Limits
Americium-241	96.4	98.60		12.8		0.643	pCi/g	102	87 - 116
Cesium-137	26.7	29.83		3.54	0.0700	0.135	pCi/g	112	87 - 120
Cobalt-60	9.47	10.16		1.22		0.0830	pCi/g	107	87 - 115

# QC Association Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1  
SDG: D1189462

## Rad

### Leach Batch: 489020

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40342-1	HPPG-ESU-TU099A-B-001	Total/NA	Solid	Dry and Grind	

### Prep Batch: 489908

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40342-1	HPPG-ESU-TU099A-B-001	Total/NA	Solid	Fill_Geo-21	489020
MB 160-489908/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-489908/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

### Prep Batch: 492111

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40342-1	HPPG-ESU-TU099A-B-001	Total/NA	Solid	DPS-7	489020
MB 160-492111/22-A	Method Blank	Total/NA	Solid	DPS-7	
LCS 160-492111/1-A	Lab Control Sample	Total/NA	Solid	DPS-7	

# Tracer/Carrier Summary

Client: Aptim Federal Services LLC  
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40342-1  
SDG: D1189462

**Method: 905 - Strontium-90 (GFPC)**

**Matrix: Solid**

**Prep Type: Total/NA**

### Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)	Y (40-110)
160-40342-1	HPPG-ESU-TU099A-B-001	90.9	87.9
LCS 160-492111/1-A	Lab Control Sample	102	94.6
MB 160-492111/22-A	Method Blank	96.8	94.6

#### Tracer/Carrier Legend

Sr = Sr Carrier

Y = Y Carrier